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A REVISION OF THE *SOLANUM HAVANENSE* SPECIES GROUP AND NEW TAXONOMIC ADDITIONS TO THE GEMINATA CLADE (*SOLANUM*, SOLANACEAE)[1]

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Abstract

Recent studies of *Solanum* L. (Solanaceae) phylogeny using both plastid and nuclear DNA sequences have shown that a distinct clade comprising the members of *Solanum* sect. *Geminata* (G. Don) Walp. (woody, non-spiny solanums with simple or branched trichomes and usually leaf-opposed inflorescences) also includes a small Caribbean group of species known as section *Diamonon* (Raf.) A. Child, whose relationships have previously been obscure: *S. acropterum* Griseb., *S. conocarpum* Dunal, *S. havanense* Jacq., and *S. troyanum* Urb. Work on a monograph of section *Holophylla* (G. Don) Walp. (s.l.) has also revealed that several species previously excluded from section *Geminata* on morphological grounds belong to the more broadly circumscribed group recognized as the Geminata clade. In addition, since the publication of the monograph of *Solanum* sect. *Geminata*, seven new species of these rare, forest understory shrubs have been described (*S. chalmersii* S. Knapp, *S. humboldtianum* Granados-Tochoy & S. Knapp, *S. monanthemon* S. Knapp, *S. naucinum* S. Knapp, *S. pseudodaphnopsis* L. A. Mentz & Stehmann, *S. sagittantherum* Granados-Tochoy & C. I. Orozco, and *S. sumacaspi* S. Knapp). An additional new species from Ecuador, *S. elvasioides* S. Knapp, is described here. I review the status and circumscription of section *Geminata* in the New World and its relation to the Geminata clade, and provide descriptions for all the species of the Caribbean *S. havanense* species group and all species previously excluded from section *Geminata*. Lectotypes are selected for *S. acropterum*, *S. hookerianum* A. Spreng., *S. myrtifolium* Lodd., *S. havanense* Vell., *S. troyanum*, *S. argentinum* Bitter & Lillo, and *S. evonymoides* Sendtn., and a neotype is selected for *S. havanense*.

Key words: Caribbean, IUCN Red List, Neotropics, section *Diamonon*, section *Geminata*, Solanaceae, *Solanum*.

The Solanaceae is an economically important, cosmopolitan family with approximately 3000 species in some 90 genera. The family has members occurring in all habitats, from the driest deserts on the western coasts of South America to the dense, wet, tropical rainforest of the Amazon and Southeast Asia. Life

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forms in the family range from canopy trees to minute ephemeral herbs, with enormous variation in between. Members of the family include globally important food crops such as potatoes and tomatoes (*Solanum tuberosum* L. and *S. lycopersicum* L., respectively) and a number of widely used drug plants such as *Nicotiana* L., the source of tobacco, and *Atropa* L., the source of atropine. Approximately half of the species in the family are contained in five genera, the largest and most diverse of which is *Solanum* L. (Knapp et al., 2004).

Solanum is one of the 10 most species-rich genera of flowering plants (Frodin, 2004). With approximately 1500 species (J. Bennett & S. Knapp, unpubl.) occurring on all temperate and tropical continents, the genus occupies an incredibly wide range of habitats and habits, paralleling that of the family. The history of *Solanum* classification has been reviewed in Knapp (2002a), but the last time the genus was monographed in its entirety was in de Candolle's *Prodromus* (Dunal, 1852). Current work by participants of the "PBI *Solanum*" project (see <http://www.nhm.ac.uk/solanaceaesource>) will result in a modern monographic treatment of the entire genus available online. *Solanum* can be divided into 13 well-supported monophyletic clades (Bohs, 2005; Weese & Bohs, 2007).

Solanum sect. *Geminata* (G. Don) Walp. is one of the largest sections of the extremely large plant genus *Solanum*. In Dunal's (1852) treatment of the group, he included 37 species (the history of classification and species description in section *Geminata* is reviewed in Knapp, 2002a). Knapp (2002a) included 126 species in section *Geminata*, defined as woody plants with leaf-opposed inflorescences, white flowers, and green fruits at maturity. These species have been considered difficult and are very similar morphologically; they have been described as "remarkably uniform on the herbarium sheet" (D'Arcy, 1973: 740), and Morton (1944: 54) described a new taxon (*S. orygale* C. V. Morton, a synonym of *S. arboreum* Dunal) as "having no outstanding features, but does not agree with any other species." Phylogenetic studies of *Solanum* using chloroplast and nuclear DNA sequences (Bohs, 2005; Weese & Bohs, 2007) have shown that the members of section *Geminata* (sensu Knapp, 2002a) form one of the 13 major clades in the genus, if a small group of endemic Caribbean species (see below) and several Neotropical taxa previously excluded from the section are included. Bohs (2005) called this larger, more inclusive monophyletic group the Geminata clade. This clade is well supported (100% bootstrap support in a three-gene analysis, Weese & Bohs, 2007), and, with 144 species currently known (see Appendix 1), it is the largest major clade of non-spiny solanums.

Solanum havanense Jacq. and *S. conocarpum* Dunal, two Caribbean endemic species previously recognized as the monospecific *Solanum* sect. *Diamonon* (Raf.) A. Child or of unknown relationships, respectively, have been included in the most recent molecular analyses (Weese & Bohs, 2007; J. C. Granados-Tochoy & L. Bohs, pers. comm.). These species are sister taxa at the base of the Geminata clade and are, in turn, apparently sister to *Solanum* sect. *Geminata* as recognized by Knapp (2002a).

Solanum delitescens C. V. Morton, recognized as a member of *Solanum* sect. *Geminata*, but of uncertain relationships by Knapp (2002a), has also been shown to be firmly nested within the Geminata clade in molecular analyses (Weese & Bohs, 2007), confirming its relationships as suggested in the earlier monograph. I excluded a number of species from the original treatment of *Solanum* sect. *Geminata* (Knapp, 2002a) based on inflorescence morphology, which I considered to be similar to that found in species of *Solanum* sect. *Holophylla* (G. Don) Walp. (s. str., see Knapp, 1989). Phylogenetic analyses using DNA sequences (Bohs, 2005; Weese & Bohs, 2007) have also shown one of these species (*S. argentinum* Bitter & Lillo) to be nested well within the Geminata clade. Subsequent study of the rest of these taxa as part of the preparation of a monograph of *Solanum* sect. *Holophylla* has shown that based on morphology, these previously excluded species are members of an enlarged and redefined Geminata clade. In addition, seven new species of the Geminata clade have been described since the publication of the monograph of *Solanum* sect. *Geminata* (Knapp, 2002a). Of the additional species included in the more broadly defined Geminata clade, only *S. argentinum*, *S. havanense*, and *S. conocarpum* have been used in molecular phylogenetic analyses (Weese & Bohs, 2007; L. Bohs, pers. comm.), but based on overall morphology, all of the other species included here belong in the larger, monophyletic Geminata clade.

For this treatment, I am defining the Geminata clade as the larger group containing all the species treated in Knapp (2002a), the set of species related to *Solanum havanense*, those taxa excluded from *Solanum* sect. *Geminata* previously, and all the species described as members of the section since Knapp (2002a). The clade has few unambiguous morphological synapomorphies (Bohs, 2005), but its members are generally woody plants with simple leaves that are glabrous or have simple or branched (never stellate) trichomes, terminal or leaf-opposed inflorescences, and white or purple flowers. In my *Flora Neotropica* monograph (Knapp, 2002a), I divided the members of section *Geminata* treated into a set of putatively monophyletic species groups. Recent molecular work has shown that these groups are, for the most part, not monophyletic (J. C. Granados-Tochoy, pers. comm.), but sampling for molecular analyses has been relatively sparse within the group, and groupings obtained are very poorly supported. Although these species groups may not be monophyletic, they serve as initial, pragmatic groupings to assess relationships and aid in identification. To that end, I place each of the species described here in one of the species groups from Knapp (2002a) in which it would belong (Table 1), but in the descriptions I also elaborate on other similar or sympatric species from the entire clade. If these species groups, or the monophyletic groupings recovered from further analysis, were to be given sectional status (as has been done for the tomatoes and their relatives; see Peralta et al., 2008), the name *Solanum* sect. *Geminata* would apply to the grouping containing *S. nudum* Dunal, the type species of the section. In light of the only preliminary phylogenetic data available for the group, I am not formally recognizing any of these groups at sectional level, but continue to use a pragmatic set of species groups (sensu Whalen, 1989) in order to aid communication and further work with this, the largest of the clades of non-spiny solanums.

Within the species of the Geminata clade as treated here, trichome morphology and inflorescence structure are both extremely variable attributes. Variation occurs within species, populations, and even individuals in the degree of trichome branching, which traditionally has been one of the most important characters used in *Solanum* taxonomy (see Knapp, 2002a). Section *Geminata*, as previously treated (Knapp, 2002a), includes species with simple trichomes and species with branched trichomes, a conclusion strongly supported by recent molecular analyses (Bohs, 2005) for the Geminata clade as a whole. As I have studied the members of the Geminata clade in its broadest sense, it has become clear that, although useful for identification purposes, trichome morphology is not likely to be a particularly reliable synapomorphy for monophyletic groups.

Although species of the Geminata clade are distributed primarily in the New World tropics, a single species (*Solanum spirale* Roxb.) is found in forest habitats in the Old World, from southern China to Australia. As for *Solanum* as a whole (see Knapp, 2002b), the species richness of the Geminata clade is circum-Amazonian, although some species are found in the Amazon Basin. Highest numbers of species are found in Colombia and Peru (with 41 species each), but the highest endemism is in Brazil, where 17 of the 34 species occurring there are endemic, most of these to southeastern Brazil (see Table 2).

In this paper, I provide descriptions for the additional species shown by molecular analyses to be members of the Geminata clade (see above), species previously excluded from the group by Knapp (2002a), and taxa in the group described since Knapp (2002a) (see Appendix 2). I also provide preliminary conservation assessments for each of the species treated here, in order to contribute to Target 2 (a preliminary conservation assessment of all known plant species) of the *Global Strategy for Plant Conservation* (Secretariat of the Convention on Biological Diversity, 2002).

The *Solanum havanense* Species Group

Shrubs or trees; stems glabrous or minutely pubescent with uniseriate trichomes, these often white; new growth glabrous or minutely pubescent; sympodial units plurifoliate. Leaves simple, elliptic to narrowly elliptic, glabrous. Inflorescences terminal or internodal, often borne on short shoots, simple or branched, usually glabrous or minutely pubescent with simple trichomes. Flowers white or purple, relatively large, to 6 cm diameter, expanding during anthesis, the corolla lobes planar at anthesis. Fruit ellipsoid, dark green or blue-green to purple; fruiting pedicels erect or deflexed; seeds rounded or ovoid, dark brown.

Distribution. All species are endemic to islands in the Caribbean, from coastal and montane forests.

Members of what I am calling here the *Solanum havanense* species group (also see Knapp, 2002a) have long been of uncertain affinity within *Solanum*. Rafinesque (1836: 76) based his genus *Diamonon*, with the single species *D. coriaceum* (Hook.) Raf., on the possession of a "constantly and unequally four-partite" (zygomorphic) calyx shown in the plate of *S. coriaceum* Hook. (Hooker, 1827). Although Hooker (1827: text opposite plate 2708) stated that flowers were "often with an irregularity" in the corolla lobes, this is not apparent from the plate in his publication. The calyx structure as depicted in Hooker's plate (see Fig. 4) shows a five-parted calyx with two of the lobes fused at the margin, a condition common in *Solanum*, where the calyx lobes do not split regularly at corolla egress (see description of *S. havanense* below). Subsequent authors (Child, 1998), not recognizing the relationship of *S. havanense* to the other species included here, considered section *Diamonon* as a distinct, monospecific group at the sectional level (as *Solanum* sect. *Diamonon*) within *Solanum*. The inflorescences borne on short shoots and large purple flowers led Nee (in litt., October 1989) to consider *S. havanense* a species of *Lycianthes* (Dunal) Bitter; closer examination of morphology coupled with molecular data (Bohs, 2005) clearly place it in the Geminata clade of *Solanum*. Two species of the group (*S. havanense* and *S. conocarpum*) have been included in the most recent molecular analysis (J. C. Granados-Tochoy & L. Bohs,

Table 1. Species groups in the Geminata clade (Knapp [2002a] and species treated here) using the species group names established by Knapp (2002a); several taxa are treated here as incertae sedis. They are clearly members of the Geminata clade but with no clear affinities to any of the pragmatic species groups listed here. Species treated in this paper are in boldface.

- ***Solanum havanense*** **species group**
  - ***Solanum acropterum*** **Griseb.**
  - ***Solanum conocarpum*** **Dunal**
  - ***Solanum havanense*** **Jacq.**
  - ***Solanum troyanum*** **Urb.**
- *Solanum oblongifolium* species group
  - *Solanum clivorum* S. Knapp
  - *Solanum hypaleurotrichum* Bitter
  - *Solanum oblongifolium* Dunal
  - *Solanum venosum* Dunal
- ***Solanum pseudocapsicum*** **species group**
  - ***Solanum argentinum*** **Bitter & Lillo**
  - ***Solanum delicatulum*** **L. B. Sm. & Downs**
  - *Solanum diphyllum* L.
  - *Solanum kleinii* L. B. Sm. & Downs
  - *Solanum malacothrix* S. Knapp
  - *Solanum pseudocapsicum* L.
  - *Solanum spissifolium* Sendtn.
- ***Solanum nudum*** **species group**
  - *Solanum acuminatum* Ruiz & Pav.
  - *Solanum aphyodendron* S. Knapp
  - *Solanum caavurana* Vell.
  - *Solanum campaniforme* Roem. & Schult.
  - *Solanum cassioides* L. B. Sm. & Downs
  - ***Solanum chalmersii*** **S. Knapp**
  - *Solanum cordioides* S. Knapp
  - *Solanum daphnophyllum* Bitter
  - *Solanum gertii* S. Knapp
  - *Solanum intermedium* Sendtn.
  - *Solanum lasiopodium* Dunal
  - ***Solanum monanthemon*** **S. Knapp**
  - *Solanum nudum* Dunal
  - ***Solanum pabstii*** **L. B. Sm. & Downs**
  - *Solanum pseudoquina* A. St.-Hil.
  - *Solanum reitzii* L. B. Sm. & Downs
  - *Solanum restingae* S. Knapp
  - *Solanum santosii* S. Knapp
  - *Solanum spirale* Roxb.
  - *Solanum symmetricum* Rusby
  - *Solanum tepuiense* S. Knapp
  - *Solanum trachytrichium* Bitter
  - *Solanum trichoneuron* Lillo
  - *Solanum warmingii* Hieron.
- ***Solanum leucocarpon*** **species group**
  - *Solanum alatirameum* Bitter
  - *Solanum corumbense* S. Moore
  - ***Solanum evonymoides*** **Sendtn.**
  - *Solanum leucocarpon* Dunal
  - *Solanum lindenii* Rusby
  - *Solanum oblongum* Ruiz & Pav.
- *Solanum nutans* species group
  - *Solanum malletii* S. Knapp

Table 1. Continued.

  - *Solanum microleprodes* Bitter
  - *Solanum nutans* Ruiz & Pav.
  - *Solanum xanthophaeum* Bitter
  - *Solanum youngii* S. Knapp
- ***Solanum amblophyllum*** **species group**
  - *Solanum amblophyllum* Hook.
  - *Solanum barbulatum* Zahlbr.
  - ***Solanum elvasioides*** **S. Knapp**
  - *Solanum laurifrons* Bitter
  - *Solanum psychotrioides* Dunal
  - *Solanum tovarii* S. Knapp
  - *Solanum vacciniiflorum* Standl. & L. O. Williams
  - *Solanum validinervium* Benítez & S. Knapp
- *Solanum deflexiflorum* species group
  - *Solanum deflexiflorum* Bitter
  - *Solanum imberbe* Bitter
  - *Solanum incomptum* Bitter
  - *Solanum irregulare* C. V. Morton
  - *Solanum sieberi* Van Heurck & Müll. Arg.
- ***Solanum arboreum*** **species group**
  - *Solanum amnicola* S. Knapp
  - *Solanum anisophyllum* Van Heurck & Müll. Arg.
  - *Solanum arboreum* Dunal
  - *Solanum falconense* S. Knapp
  - *Solanum goniocaulon* S. Knapp
  - *Solanum gratum* Bitter
  - ***Solanum humboldtianum*** **Granados-Tochoy & S. Knapp**
  - *Solanum laevigatum* Dunal
  - *Solanum lucens* S. Knapp
  - *Solanum plowmanii* S. Knapp
  - *Solanum ramonense* C. V. Morton & Standl.
  - *Solanum ripense* Dunal
  - *Solanum roblense* Bitter
  - ***Solanum sagittantherum*** **Granados-Tochoy & C. I. Orozco**
  - *Solanum tanysepalum* S. Knapp
- *Solanum unifoliatum* species group
  - *Solanum bahianum* S. Knapp
  - *Solanum bellum* S. Knapp
  - *Solanum cyclophyllum* S. Knapp
  - *Solanum longevirgatum* Bitter
  - *Solanum marantifolium* Bitter
  - *Solanum triplinervium* C. V. Morton
  - *Solanum unifoliatum* S. Knapp
- *Solanum robustifrons* species group
  - *Solanum abitaguense* S. Knapp
  - *Solanum cucullatum* S. Knapp
  - *Solanum heleonastes* S. Knapp
  - *Solanum robustifrons* Bitter
  - *Solanum superbum* S. Knapp
- *Solanum narcoticosmum* species group
  - *Solanum dasyneuron* S. Knapp
  - *Solanum foetens* S. Knapp
  - *Solanum narcoticosmum* Bitter
- ***Solanum nigricans*** **species group**
  - *Solanum callianthum* C. V. Morton
  - ***Solanum canoasense*** **L. B. Sm. & Downs**

Table 1. Continued.

- *Solanum cornifolium* Dunal
- *Solanum maturecalvans* Bitter
- *Solanum nigricans* M. Martens & Galeotti
- *Solanum ochrophyllum* Van Heurck & Müll. Arg.
- *Solanum platycypellon* S. Knapp
- *Solanum quebradense* S. Knapp

Solanum arenarium species group
- *Solanum arenarium* Sendtn.
- ***Solanum compressum* L. B. Sm. & Downs**
- *Solanum gnaphalocarpon* Vell.
- ***Solanum pseudodaphnopsis* L. A. Mentz & Stehmann**
- *Solanum smithii* S. Knapp
- *Solanum tunariense* Kuntze

Solanum sessile species group
- *Solanum chlamydogynum* Bitter
- *Solanum confertiseriatum* Bitter
- *Solanum monadelphum* Van Heurck & Müll. Arg.
- *Solanum obovalifolium* Pittier ex Benítez
- *Solanum oppositifolium* Ruiz & Pav.
- *Solanum palmillae* Standl.
- *Solanum rovirosanum* Donn. Sm.
- *Solanum sessile* Ruiz & Pav.
- *Solanum triste* Jacq.
- *Solanum turgidum* S. Knapp

Solanum confine species group
- *Solanum capillipes* Britton
- *Solanum confine* Dunal
- *Solanum cruciferum* Bitter
- *Solanum darienense* S. Knapp
- *Solanum dissimile* C. V. Morton
- *Solanum erosomarginatum* S. Knapp
- *Solanum hypocalycosarcum* Bitter
- *Solanum leptopodum* Van Heurck & Müll. Arg.
- *Solanum leptorhachis* Bitter
- *Solanum morii* S. Knapp
- *Solanum nematorhachis* S. Knapp
- *Solanum ombrophilum* S. Knapp
- *Solanum pastillum* S. Knapp
- *Solanum pertenue* Standl. & C. V. Morton
- *Solanum stipulatum* Vell.
- *Solanum tenuiflagellatum* S. Knapp
- *Solanum tuerckheimii* Greenm.
- *Solanum valerianum* C. V. Morton & Standl.
- *Solanum yanamonense* S. Knapp

Solanum dolosum species group
- *Solanum dolosum* C. V. Morton ex S. Knapp
- *Solanum gonyrhachis* S. Knapp
- *Solanum habrocaulon* S. Knapp
- ***Solanum naucinum* S. Knapp**

Taxa incertae sedis
- *Solanum delitescens* C. V. Morton
- *Solanum lasiocladum* S. Knapp
- *Solanum mapiricum* S. Knapp
- ***Solanum sumacaspi* S. Knapp**

pers. comm.), and they are resolved as sister taxa at the base of the Geminata clade and are, in turn, apparently sister to *Solanum* sect. *Geminata* as recognized by Knapp (2002a).

Preliminary conservation assessments are given here for the members of the *Solanum havanense* group in advance of a paper outlining the specific criteria for formal IUCN listing for all endemic Caribbean species of *Solanum* (Yoder et al., in prep.).

KEY TO THE SPECIES OF THE *SOLANUM HAVANENSE* SPECIES GROUP

1a. Flowers white; pedicels strongly winged . . . . *S. acropterum*
1b. Flowers purple; pedicels not winged.
  2a. New growth completely glabrous; leaves drying dark; flowers 3.5–6 cm diam. . . . . *S. troyanum*
  2b. New growth pubescent with white trichomes, these usually simple but sometimes dendritic.
    3a. Berry erect, dark purplish black, fleshy; anther pores minute, never splitting to slits . . . . *S. havanense*
    3b. Berry pendent, green, hard and woody; anther pores lengthening to slits with age . . . . *S. conocarpum*

1. Solanum acropterum Griseb., Fl. Brit. W.I. [Grisebach] 437. 1862. TYPE: Jamaica. s. loc., s.d., *J. Waters s.n.* (lectotype, designated here, K 000005250!). Figure 1.

Small trees to 10 m; stems erect, completely glabrous; bark pale gray-brown when young, darker red on older stems; new growth glabrous; sympodial units plurifoliate, appearing difoliate, but the inflorescence one per stem on short shoots. Leaves (2)5.5–14 × (1)3–5.5 cm, elliptic, glabrous on both surfaces, when dry densely white-spotted with crystal sand (oxalate inclusions), darker green adaxially (fide *Stearn 499*), the base acute to somewhat attenuate, the margins entire, the apex acute, rounded at the very tip; primary veins 5 to 8 pairs, drying yellow on older leaves, reddish orange on young leaves; petiole 1–2.5 cm, glabrous, markedly corrugated. Inflorescences leaf-opposed and on short leafy shoots, 2–6 cm, branching 1 to 3 times, with 3 to 15 flowers, completely glabrous, the peduncle almost absent to 2 cm; pedicels 15–20 mm, strongly and conspicuously 5-winged from the midrib of the calyx lobes, glabrous, nodding at anthesis, ca. 5 mm diam. at the apex, ca. 1 mm diam. at the base, the wings to 1.5 mm wide, articulated at the base; pedicel scars irregularly spaced 1–2 mm apart, the pedicels articulating slightly above the base leaving a peg 1–3 mm on the inflorescence; buds ellipsoid, the corolla ca. 1/2 of the way exserted from the calyx tube, included in the lobes. Flowers apparently all perfect; calyx tube 3–

Table 2. Geographical distribution of the Neotropical members of the Geminata clade (Knapp, 2002 and the species treated here) by country. Countries are listed in alphabetical order, followed by the number of endemics/total number of species. Country-endemic species are in boldface. *Solanum spirale* is the only exclusively Old World member of the group; its distribution is given in Knapp (2002a).

Country (endemics/total)	Species of the Geminata clade
Argentina (1/14)	argentinum, caavurana, compressum, corumbense, delicatulum, **delitescens**, heleonastes, maturecalvans, platycypellon, pseudocapsicum, pseudoquina, symmetricum, trachytrichium, trichoneuron
Belize (0/4)	diphyllum, nudum, rovirosanum, tuerckheimii
Bolivia (6/26)	acuminatum, aphyodendron, argentinum, **chalmersii**, confine, corumbense, daphnophyllum, **gonyrhachis**, heleonastes, leucocarpon, lindenii, **mapiricum**, maturecalvans, **monanthemon**, nudum, nutans, ochrophyllum, oppositifolium, platycypellon, pseudocapsicum, robustifrons, sessile, **superbum**, symmetricum, trichoneuron, **tunariense**
Brazil (17/34)	**alatirameum**, anisophyllum, **arenarium**, **bahianum**, caavurana, campaniforme, **canoasense**, cassioides, compressum, **cordioides**, corumbense, delicatulum, **evonymoides**, **gertii**, **intermedium**, **kleinii**, leptopodum, leucocarpon, nudum, oppositifolium, **pabstii**, pseudocapsicum, **pseudodaphnopsis**, pseudoquina, **reitzii**, **restingae**, robustifrons, **santosii**, sessile, **spissifolium**, **stipulatum**, symmetricum, trachytrichium, **warmingii**
Chile (0/1)	pseudocapsicum
Colombia (9/41)	aphyodendron, arboreum, barbulatum, callianthum, cornifolium, cyclophyllum, darienense, deflexiflorum, dissimile, dolosum, **humboldtianum**, imberbe, **irregulare**, laevigatum, lasiopodium, **laurifrons**, leptopodum, leptorhachis, leucocarpon, **longevirgatum**, lucens, malletii, marantifolium, microleprodes, **nematorhachis**, nudum, nutans, oblongifolium, oppositifolium, pseudocapsicum, **psychotrioides**, ripense, rovirosanum, **sagittantherum**, sessile, sieberi, **triplinervium**, **unifoliatum**, vacciniiflorum, validinervium, venosum
Costa Rica (0/15)	aphyodendron, arboreum, diphyllum, imberbe, incomptum, narcoticosmum, nudum, pastillum, pertenue, ramonense, roblense, rovirosanum, tuerckheimii, vacciniiflorum, valerianum
Cuba (0/2)	havanense, nudum
Dominica (0/2)	nudum, triste
Dominican Republic (0/1)	nudum
Ecuador (3/35)	abitaguense, anisophyllum, barbulatum, bellum, confertiseriatum, confine, cornifolium, corumbense, cruciferum, cucullatum, cyclophyllum, deflexiflorum, dolosum, goniocaulon, **elvasioides**, **hypaleurotrichum**, **hypocalycosarcum**, leptopodum, leptorhachis, leucocarpon, malletii, marantifolium, maturecalvans, nudum, nutans, oblongifolium, oppositifolium, plowmanii, pseudocapsicum, robustifrons, sessile, smithii, triplinervium, venosum, youngii
El Salvador (0/3)	aphyodendron, diphyllum, nudum
French Guiana (0/4)	campaniforme, leucocarpon, morii, oppositifolium
Grenada (0/1)	nudum
Guatemala (0/9)	aphyodendron, dasyneuron, diphyllum, narcoticosmum, nigricans, nudum, pseudocapsicum, rovirosanum, tuerckheimii
Guyana (0/3)	campaniforme, leucocarpon, oppositifolium
Haiti (0/1)	nudum
Honduras (0/4)	aphyodendron, diphyllum, nigricans, nudum
Jamaica (2/4)	**acropterum**, havanense, nudum, **troyanum**
Martinique (0/2)	sieberi, triste
Mexico (2/11)	aphyodendron, dasyneuron, diphyllum, **malacothrix**, narcoticosmum, nigricans, nudum, **palmillae**, pseudocapsicum, rovirosanum, tuerckheimii
Nicaragua (0/8)	aphyodendron, diphyllum, nudum, pastillum, pertenue, rovirosanum, tuerckheimii, valerianum
Panama (0/15)	aphyodendron, arboreum, darienense, imberbe, incomptum, leucocarpon, microleprodes, narcoticosmum, nudum, pertenue, ramonense, rovirosanum, tuerckheimii, vacciniiflorum, valerianum
Paraguay (0/10)	argentinum, caavurana, compressum, corumbense, delicatulum, heleonastes, pseudocapsicum, pseudoquina, symmetricum, trachytrichium

Table 2. Continued.

Country (endemics/total)	Species of the Geminata clade
Peru (11/41)	abitaguense, acuminatum, **amblophyllum**, **amnicola**, anisophyllum, aphyodendron, barbulatum, bellum, **clivorum**, confertiseriatum, confine, corumbense, cruciferum, cucullatum, daphnophyllum, goniocaulon, **habrocaulon**, laevigatum, leptopodum, leptorhachis, leucocarpon, lindenii, malletii, maturecalvans, **monadelphum**, **naucinum**, nudum, oblongifolium, **oblongum**, ochrophyllum, oppositifolium, plowmanii, pseudocapsicum, robustifrons, sessile, smithii, **sumacaspi**, **tovarii**, **xanthophaeum**, **yanamonense**, youngii
Puerto Rico (0/1)	nudum
Suriname (0/2)	leucocarpon, morii
Trinidad and Tobago (0/6)	arboreum, capillipes, nudum, pseudocapsicum, sieberi, triste
Uruguay (0/1)	pseudocapsicum
Venezuela (12/32)	aphyodendron, arboreum, campaniforme, capillipes, **chlamydogynum**, cornifolium, dissimile, **erosomarginatum**, **falconense**, **foetens**, **gratum**, imberbe, lasiocladum, leucocarpon, **lucens**, morii, nudum, oblongifolium, **obovalifolium**, ombrophilum, oppositifolium, pseudocapsicum, **quebradense**, ripense, sessile, sieberi, **tanysepalum**, **tenuiflagellatum**, **tepuiense**, triste, **turgidum**, validinervium
Virgin Islands (1/2)	**conocarpum**, nudum

3.5 mm, cup-shaped, glabrous, the lobes 3–8 mm, narrowly triangular to lanceolate, winged abaxially, the wing continuing onto the pedicel, glabrous, the apex rounded; corolla 2–2.5 cm diam., white, lobed 1/3 to 1/2 of the way to the base, the lobes ca. 1 cm, deltate to narrowly deltate, campanulate at anthesis, minutely papillose with tangled white trichomes at the tips; filaments with the free portion 1.5–2 mm, the filament tube less than 0.5 mm, glabrous; anthers 4–5 × 1–1.5 mm, the dorsal face thickened and darker when dry, slightly rounded-sagittate at the base, poricidal at the tips, the pores lengthening to slits with age; ovary conical, glabrous, the style 8–9 mm, straight, glabrous, the stigma minutely capitate, the surface papillate. Fruit a globose berry, becoming ellipsoid, ca. 1.2 × 1 cm (immature), green; fruiting pedicels ca. 2 cm, ca. 1.5 mm diam. at the base, woody, pendent; seeds ca. 3 × 2 mm, rounded reniform (immature), dark brown, the surfaces minutely reticulate-pitted. Chromosome number not known.

Distribution. Endemic to Jamaica, where it occurs in woods on limestone hills in the cloud forests of primarily the John Crow Mountains from 100–700 m.

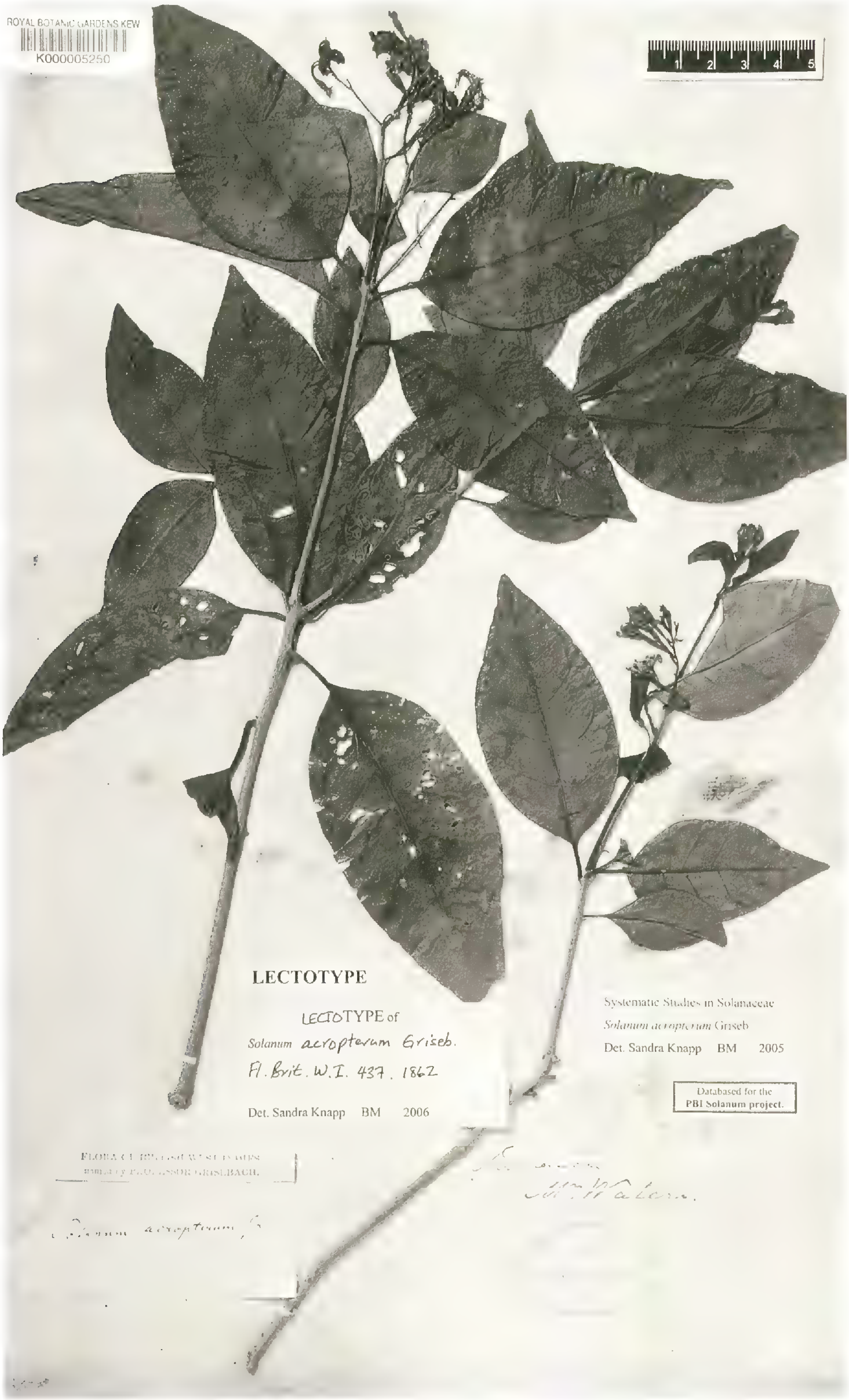
Discussion. *Solanum acropterum* is a distinctive species with its strongly winged, completely glabrous pedicels and ellipsoid berries. The inflorescences are borne one to a short shoot, making the flower-bearing portion of the plant look somewhat bushy. In contrast to the other members of the *S. havanense* group, the flowers of *S. acropterum* are white rather than purple. Mature fruits of *S. acropterum* are not known, but appear to be ellipsoid and are likely to be blue-green, purple, or black, as are the fruits of *S. havanense*.

Solanum acropterum is known only from the John Crow Mountains and a few other forest habitats in central Jamaica; due to this restricted distribution on a single island, it is likely to be of conservation concern (Yoder et al., in prep.) and was listed in 1997 as Rare (Walter & Gillett, 1998). This species can be assigned a preliminary conservation status of Vulnerable (VU) (IUCN, 2001), but there is a reasonable basis to consider *S. acropterum* as Endangered (EN) due to paucity of collections and its status as a single island endemic (Yoder, 2006).

Grisebach (1862) cited two collections in his original description of *Solanum acropterum*, *Waters s.n.* and *Wilson s.n.*, both at K. The Waters sheet (K 000005250) has been chosen as the lectotype because it has both flowers and fruit (Fig. 1). Neither sheet has specific collecting locality information.

Additional specimens examined. JAMAICA. s. loc., 1844, *Purdie s.n.* (K [2]); *Wilson s.n.* (K). **Hanover Parish:** Dolphin Head & vic., *Britton 2294* (K, NY), *Harris 10298* (BM, F, NY, US). **Portland Parish:** E slopes, John Crow Mtns., *Britton 4137* (NY). **Saint Ann Parish:** Union Hill, near Moneague, *Britton & Hollick 2807* (NY, US); Stirling Castle Forest Reserve, vic. Alumina Jamaica tramline, *Howard 15024* (A). **Saint Thomas Parish:** E slopes of S end of John Crow Mtns., *Harris & Britton 10723* (F, K, NY, US), *Harris 10752* (F, K, NY, US); Big Level Distr., SE end of the John Crow Mtns., *Proctor 11802* (US), *Stearn 499* (A, BM [4], K [2], MO), *Webster & Proctor 5546* (BM, G, NY, US). **Trelawny Parish:** Paynes Patent, 2 mi. WNW of Quick Step, 9 Mar. 1949, *Lewis s.n.* (US); Windsor, *Miller 1490* (US).

2. **Solanum conocarpum** Dunal in Poir., Encycl. Suppl. 3: 748. 1814. TYPE: U.S. Virgin Islands. St. John: Coral Bay, *L. C. Richard s.n.* (holotype, P!; isotype, F 976721 [fragm.]!). Figure 2A.


ROYAL BOTANIC GARDENS KEW
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LECTOTYPE
LECTOTYPE of
Solanum acropterum Griseb.
Fl. Brit. W.I. 437. 1862
Det. Sandra Knapp BM 2006
Systematic Studies in Solanaceae
Solanum acropterum Griseb
Det. Sandra Knapp BM 2005
Databased for the
PBI Solanum project.
Waters.

Figure 1. Lectotype specimen of *Solanum acropterum* (*Waters s.n.* [K]).

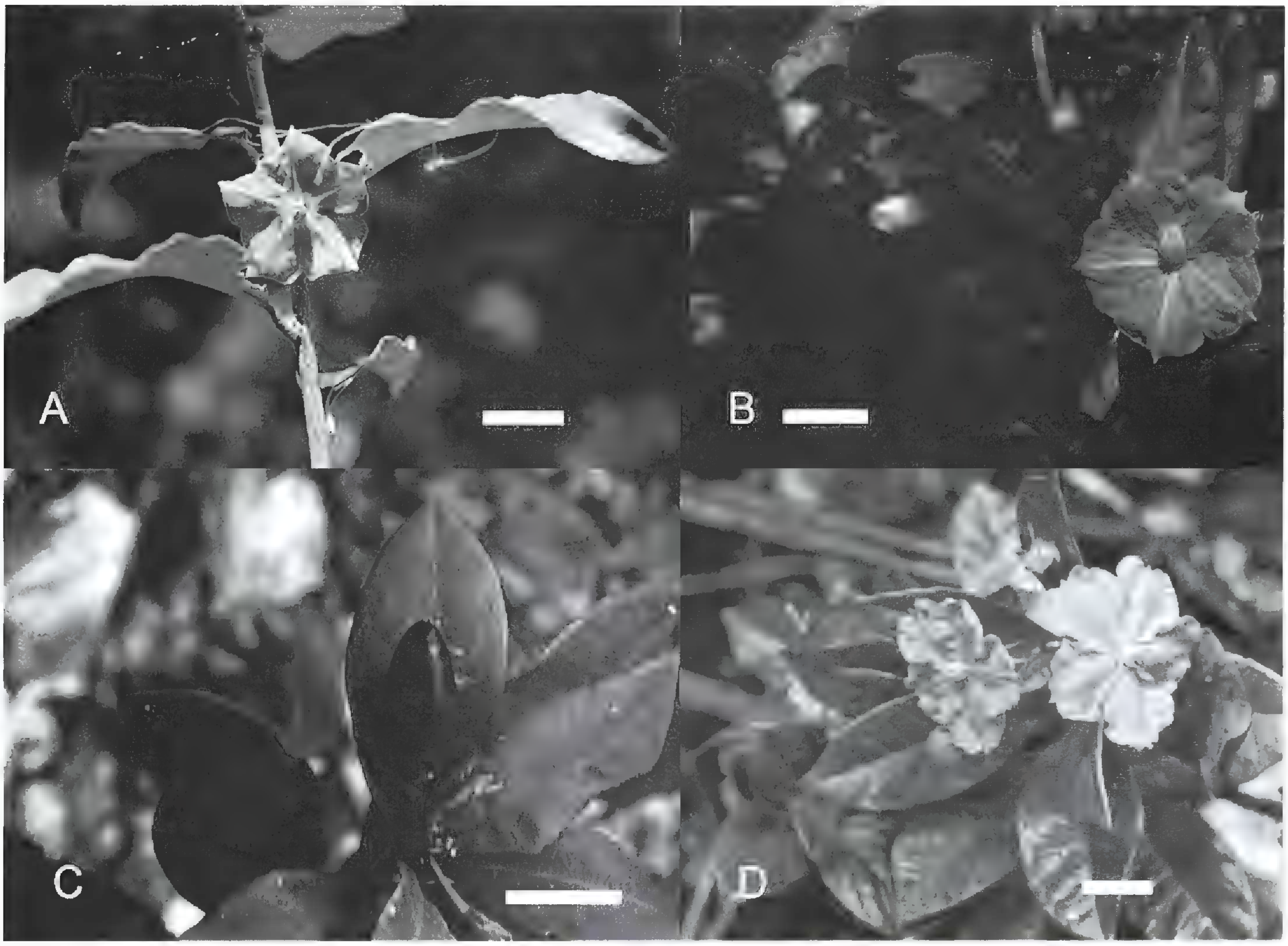


Figure 2. Flowers and fruit of members of the *Solanum havanense* species group. —A. *S. conocarpum* flower (photo, P. Acevedo). —B. *S. havanense* flower (photo, C. D. Adams). —C. *S. havanense* fruit (photo, C. D. Adams). —D. *S. troyanum* flowers (photo, C. D. Adams). Scale bars = 1 cm.

Shrubs to 2 m; stems ± stout, erect, pale grayish white to brown, glabrescent; new growth densely pubescent with simple uniseriate trichomes ca. 0.5 mm, soon glabrescent; bark white, exfoliating; sympodial units plurifoliate. Leaves 3–6 × 1.5–2.5 cm, elliptic, glabrous on both surfaces, the base acute, the margins entire, the apex acute to acuminate; primary veins 7 to 8 pairs, sometimes drying yellowish green; petiole 0.5–0.8 cm, glabrous. Inflorescences leaf-opposed, terminal on short axillary shoots, 0.4–0.6 cm, simple, with 1 to 3 flowers, densely pubescent with simple, uniseriate trichomes to 0.5 mm, the peduncle absent to 0.3 cm; pedicels 2–4 mm, stout, ca. 1 mm diam. at base and apex, erect at anthesis, glabrous, articulated at the base; pedicel scars closely spaced, somewhat overlapping; buds globose, the corolla ca. 1/2 to completely exserted. Flowers heterostylous; calyx tube 1–2 mm, broadly cup-shaped, glabrous, the lobes 1.5–2 mm, deltate, glabrous with an apical tuft of uniseriate trichomes; corolla 1.5–2 cm diam., bright purple or violet, lobed ca. 1/4 to 1/3 of the way to the base, the lobes ca. 2 × 1 mm, broadly deltate, planar at anthesis, densely papillose-pubescent at the tips; filaments glabrous, the free portion 1–15 mm, the filament tube less than 0.5 mm or absent; anthers 2–2.5 mm, poricidal at the tips, the pores with thickened edges, slightly lengthening to slits with age; ovary long-conical, the style 6–8 mm in long-styled flowers, less than 2 mm in short-styled flowers, glabrous, the stigma broadly capitate, the surface minutely papillose. Fruit a conical berry, 3–5 × 2–3.5 cm, hard and green at maturity, the pericarp woody, the apex sharply pointed; fruiting pedicel 2–3 cm, ca. 5 mm diam. at the base, woody and pendent from the weight of the berry; seeds not seen. Chromosome number not known.

Distribution. Endemic to the island of St. John in the U.S. Virgin Islands (and perhaps also St. Thomas and Virgin Gorda, fide Acevedo-Rodríguez, 1996), growing in seasonally dry, coastal habitat, in forest understory or in open areas from 0–500 m.

Common name. "Marron bacoba" (Dunal, 1852).

Discussion. Solanum conocarpum is quite similar in vegetative morphology to *S. havanense*, and it inhabits the same sorts of coastal habitats. The two species do not appear to be sympatric, and *S.*

havanense is found on Cuba, Jamaica, and the Cayman Islands but is not found in the Virgin Islands. The flowers of *S. conocarpum* are more stellate in outline than those of *S. havanense*, and usually have a distinct white eye (see Fig. 2A, B). The fruits of the two species are completely different; *S. conocarpum* has very large, conical berries that are green at maturity and are borne on woody, pendent pedicels, while the berries of *S. havanense* are smaller, ellipsoid, and dark purplish blue at maturity and are borne on erect pedicels (Fig. 2C).

Solanum conocarpum was proposed for listing as endangered under the U.S. Fish and Wildlife Endangered Species Act in 1998, but in 2006 the decision was made that the listing was not warranted due to lack of information about this species (<http://www.fws.gov/southeast/news/2006/r06-016.html>). Based on the paucity of collections and the current population data, this species can be assigned a preliminary conservation status of Critically Endangered (Yoder, 2006). The record of *S. conocarpum* from Puerto Rico cited in the 1997 IUCN Red List (Walter & Gillett, 1998, based on a record in The Nature Conservancy's 1996 National Heritage Database, not available online) is likely to be an error. I have seen no authentic material of *S. conocarpum* from Puerto Rico.

Acevedo-Rodríguez (1996) knew of *Solanum conocarpum* only from a single plant on St. John but suggested it might also occur on St. Thomas and Virgin Gorda. I have seen no material from either island, although Acevedo-Rodríguez cites a sterile specimen (*Little 23836*) from Virgin Gorda that I have not examined. Forbes et al. (pers. comm., 2005) have found fewer than 200 individuals of *S. conocarpum* in the wild and have suggested that the species is self-incompatible, since plants do not set fruit when grown in isolation. *Solanum conocarpum* has suffered severe loss of genetic diversity (Stanford et al., 2002; A. M. Stanford, pers. comm.), indicating that this species is a high priority for listing at both a global and national level.

Additional specimens examined. U.S. VIRGIN ISLANDS. **St. John:** Reef Bay Quarter, along trail from Lameshur to Reef Bay ruins, *Acevedo et al. 5437* (K, MO).

3. Solanum havanense Jacq., Enum. Syst. Pl. 15. 1760. TYPE: Jamaica. Tab. 35, Jacquin, 1763 (neotype, designated here, tab. 35 in Jacquin, 1763!). Figures 2B, C, 3.

Solanum hookerianum A. Spreng., Tent. Suppl. 9. 1828, replacement name for *Solanum coriaceum* Hook., 1827. Replaced synonym: *Solanum coriaceum* Hook., Bot. Mag. 54: 2708. 1827. *Diamonon coriaceum* (Hook.) Raf., Fl. Tellur. 2: 76. 1836 [1837]. *Solanum byrsinum* Voigt, Hort. Suburb. Calcutt. 511. 1845, nom. illeg., superfl. TYPE: Plate 2708, based on a plant cultivated in England, the seeds said to be sent by R. Barclay from Mexico (lectotype, designated here, plate 2708 in Hooker, 1827!).

Solanum myrtifolium Lodd., Bot. Cab. 25: pl. 1431. 1828. TYPE: Plate 1431, based on a plant cultivated in London (lectotype, designated here, plate 1431 in Loddiges, 1828!).

Solanum havanense Vell., Fl. Flumin. 82. 1829, nom. illeg. TYPE: Icon. Tab. 94, Brazil. Rio de Janeiro: Pharmocopolis (lectotype, designated here, tab. 94 in Vellozo, 1827 [1831]!).

Solanum vacciniifolium Dunal, Prodr. (DC.) 13(1): 160. 1852. *Solanum havanense* Jacq. var. *vacciniifolium* (Dunal) Griseb., Cat. Pl. Cub. 189. 1866. TYPE: Cuba. Havana, *de la Sagra 294* (holotype, G-DC!, F neg. 33944!, IDC microfiche 800-61.2075:I.2!).

Shrubs to 3 m; stems erect, glabrescent; bark dark or pale gray; new growth densely pubescent with minute appressed, simple or occasionally dendritic uniseriate trichomes to 0.5 mm, soon glabrescent; sympodial units plurifoliate. Leaves (1.5)2–9 × (0.8)1.1–4.5 cm, elliptic, thick and coriaceous, glabrous and shiny adaxially, sparsely pubescent abaxially with minute simple and dendritic uniseriate trichomes less than 0.5 mm along the main veins and with scattered longer trichomes to 1 mm, the base attenuate, the margins entire and revolute, the apex acute or sometimes rounded; primary veins 5 to 6 pairs, drying reddish orange; petioles 0.2–1 cm, pubescent with uniseriate trichomes like the stems. Inflorescences leaf-opposed, internodal or sometimes on short shoots, 0.4–1.3 cm, with 3 to 6 flowers, simple, densely pubescent with simple uniseriate trichomes to 0.5 mm, the peduncle 0.2–0.5 cm; pedicels 0.6–1 cm, ± fleshy, ca. 1 mm diam. at base and apex, erect at anthesis, sparsely pubescent with simple uniseriate trichomes like the inflorescence, articulated at the base; pedicel scars ca. 1–2 mm apart, articulated at the base or with a small peg remaining after abscission; buds globose, the corolla included until just before anthesis. Flowers apparently all perfect; calyx tube 1 2 mm, cup-shaped, the lobes 3–5 mm, lanceolate, tearing at anthesis along the sinuses, sparely pubescent with a tuft of simple uniseriate trichomes at the apex; corolla 2–3 cm diam., violet, fading to pale violet or white, lobed ca. 1/4 of the way to the base, the lobes splitting as anthesis proceeds, the lobes 0.5–1 cm, deltate to ovate, planar at anthesis, densely white papillose at the tips; filaments with the free portion 1–1.5 mm, the filament tube less than 0.5 mm or absent; anthers 3.5–4 × 1.5–2.5 mm, poricidal at the tips, the pore not lengthening; ovary glabrous, somewhat conical, the style 7.5–9 mm, glabrous, the stigma capitate, the surface minutely papillate. Fruit an ovoid to ellipsoid berry, 1–1.2 × 0.9–1.2 cm, dark blue-purple or black at maturity, soft and fleshy, the pericarp thin, the apex

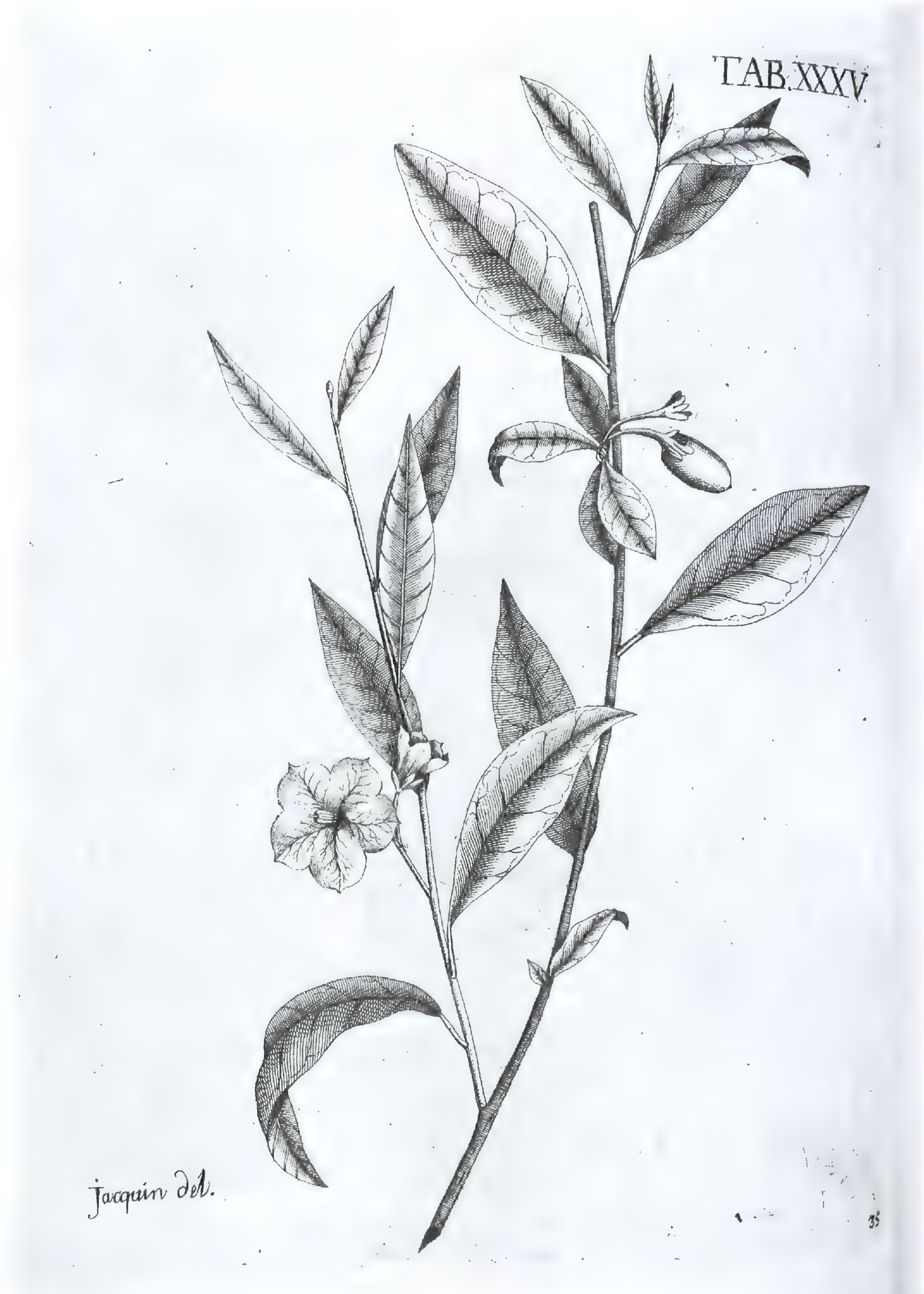

TAB.XXXV.
Jacquin del.
35

Figure 3. Neotype of *Solanum havanense* (Jacquin, 1763: tab. 35). Image reproduced with permission of Botany Library, The Natural History Museum.

rounded; fruiting pedicels 1–1.2 cm, woody and erect, ca. 1 mm diam. at the base; seeds ca. 7 × 3 mm, ovoid, reddish brown, the surfaces minutely pitted, the testal cell walls straight. Chromosome number not known.

Distribution. In woods on limestone from 0–100 m, on Cuba, Jamaica, and the Cayman Islands.

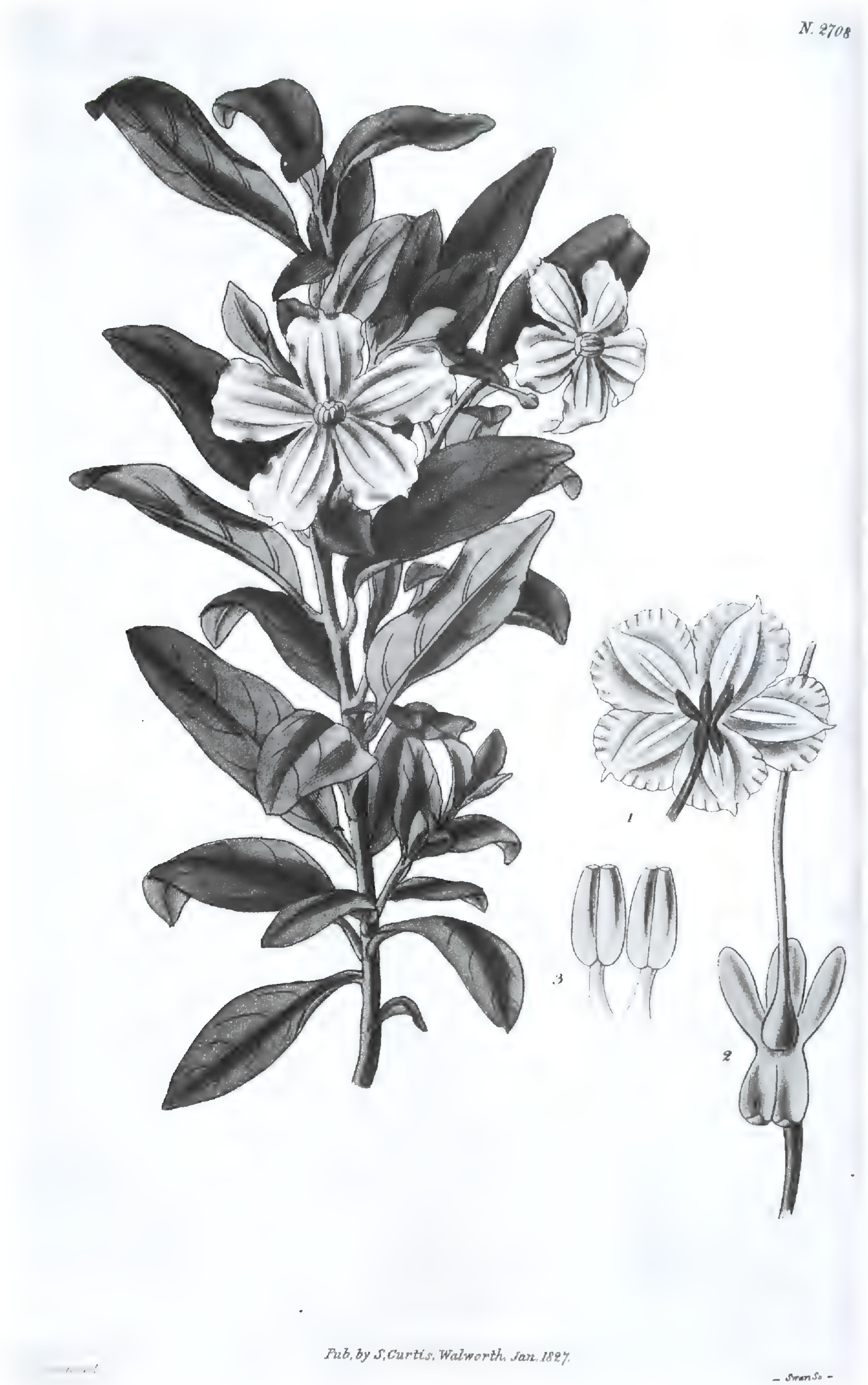
Common name. Dominican Republic: "roblina" (*Jimenez 1907*).

Discussion. *Solanum havanense* is a striking plant, with its large purple flowers and bright purplish blue to black fruits (Fig. 2B, C). It was brought into cultivation in Europe and appears to have been spread widely amongst botanic gardens (see synonyms), with some loss of information as to its original provenance. The flowers of *S. havanense* expand through anthesis, with the corolla lobes becoming both larger and more divided with time (see Fig. 2B; and shown clearly in Hooker, 1827). The corolla color also fades from bright to pale purple, and the lobe orientation becomes more planar as the flower ages (Fig. 2B).

Solanum havanense is relatively common and widespread in the Greater Antilles, occurring on Cuba, Jamaica, and the Cayman Islands (a single collection, possibly cultivated), but apparently absent from Puerto Rico and Hispaniola; the single specimen from the Dominican Republic (*Jiménez 1907*) is most probably cultivated. Specimen data indicate that it is relatively common, although its habitat is the coastal fringe, making it possibly at risk from coastal development. It has been assigned a preliminary conservation status of Near Threatened (NT) and standard monitoring is suggested (Yoder, 2006).

No specimen of *Solanum havanense* attributable to Jacquin has been found, despite intensive searches in many herbaria (principally BM, LINN, and W; see Stafleu & Cowan, 1979) where such a sheet, if it had ever existed, might have been preserved. No original material was cited in the protologue (Jacquin, 1760), so any type selected must be a neotype. The illustration of *S. havanense* in Jacquin's first illustrated edition of the *Selectarum Stirpium Americanarum Historia* (Jacquin, 1763), a copper engraving taken from original drawings done by Jacquin in the field (see Wiltshear, 1913), is very accurate, and I have chosen it here as the neotype of the species (Fig. 3). The much more detailed description in Jacquin (1763) mentions the distinctive blue fruit of *S. havanense*, and the plate in the hand-painted color edition of *Selectarum Stirpium Historia Iconibus* (Jacquin, 1780) clearly shows this. Similarly, specimens of neither *S. coriaceum* nor *S. myrtifolium* have been found. A specimen of *S. havanense* labeled as "Solanum coriaceum Hook. Bot. Mag." at Kew (K 00005238) is not clearly associated with the description and does not have the distinctive calyx morphology depicted in the plate. These names too are lectotypified using the original illustrations (Figs. 4, 5). Vellozo's (1825) description of *S. havanense* may be a re-description of Jacquin's plant, but no reference to Jacquin is made in the protologue or accompanying material. I have lectotypfied it using the illustrations published in 1831, as no herbarium specimens are extant from Vellozo's work (Carauta, 1973). *Solanum hookerianum* (Sprengel, 1828: 9) and *S. byrsinum* (Voigt, 1845: 511) were both proposed as replacement names for *S. coriaceum* Hook., which is homonymic with *S. coriaceum* Dunal, a spiny vine from northern South America.

Additional specimens examined. CAYMAN ISLANDS. **Grand Cayman:** 3/4 mi. N of Half Moon Bay, *Brunt 2200* (BM). CUBA. s. loc., *Anon. s.n.* (MO); San Antonio, *Hitchcock s.n.* (F); s. loc., *Mèrat de Vaumartoise s.n.* (W); Lemonal, May 1823, *Poeppig s.n.* (W); s. loc., *Poeppig s.n.* (W); s. loc., *de la Sagra s.n.* (W); s. loc., *Wright 3025* (BM, G, G-DC, GH, K, MO, US, W); Santa Clara, vic. of Soledad, along creek which crosses trail to Guaos, *Howard 5740* (GH, JBSD, US). **La Habana:** Cojímar, *Alain 2394* (US), *Alain, Bro. 2396* (GH); Sierra del Grillo, Madruga, *Alain 5280* (GH); Havana, *Anon. s.n.* (W); La Playa de Marianao, *Curtiss 716* (A, BM, F, G, K, MO, US); Loma Esperon, *Ekman 10555* (F); Sierra de Anafe, *León 7135* (GH); Tamory Mtes, *Rugel 94* (BM). **Matanzas:** Matanzas, *Rugel, F. 144* (BM [2], K). **Pinar del Rio:** base of Sierra de Jíbaro, El Ancón, Viñales, *Alain 4292* (GH, US); Bay of Mariel, *Britton & Earle 7609* (US); Mariel Tinaja, *Ekman 12876* (A, G); Loma Harenales, S of Sumidero, *Schafer 3795* (A, US); Loma de Esperon, on the NW outskirts of Caimito, near border of Habana province, *Webster 3700* (GH, US); Sierra de Anafe, *Wilson 11305* (US). **Santa Clara [Cienfuegos]:** Cienfuegos, Cieneguita N, *Combs 114* (F [2], GH, K, MO); Guabairo, Soledad, Cienfuegos, *Jack 7317* (A, F, US); Blanco's Woods, near the E shore of Cienfuegos Bay, SW of Soledad, *Webster et al. 51* (A). **Villa Clara:** Dolores near Soledad Central, *Howard 6590* (A [2]). DOMINICAN REPUBLIC. **Santiago:** Ciudad de Santiago, *Jiménez 1907* (US). JAMAICA. Hector's River, *Harris & Britton 10718* (K, NY, US); s. loc., *MacFadyen s.n.* (K [2]), *Mar 1666* (K), *Wilson s.n.* (GH), *Wilson s.n.* (K [2]), *Wright s.n.* (BM, K). **Manchester Parish:** Gut River, *Adams 6333* (BM); 1 mi. ESE of God's Well, N side of Round Hill, *Stearn 634* (BM). **Portland:** Priestman's Bay, *Bailey 731* (US); vic. of Port Antonio, mouth of Priestman's River, *Britton 891* (F, NY); Long Bay, *Britton 4213* (NY); Priestman's River, *Proctor 6104* (US); near Rural Hill, *Proctor 31565* (MO); Turtle Cove, near Bennett Point, about 2 mi. due E of Port Antonio, *Stearn 537* (BM); near mouth of Priestman's River, *Yuncker 18423* (NY). **Saint Andrew Parish:** vic. of Kingston, Ferry River, *Britton 401* (F, NY), *Britton 2831* (NY); Ferry Pen, *Campbell 6175* (F); hill behind the Quarry at the Ferry, *Harris 10036* (BM, F, NY, US), *Harris 10036* (K); Hector's River, 9 Mar. 1909, *Harris & Britton 10718* (F); Ferry Pen, *Herb. Bot. Dept. Jamaica 6175* (NY), *Herb. Bot. Dept. Jamaica 6248* (GH); W side of Ferry Hill, 3/4 mi. up Old Ferry Rd., near Fresh River, *Stearn 821* (BM); Ferry Hill, Ferry Pen, *Webster et al. 8076* (BM, G [2]). **Saint Ann Parish:** Fort Point, Sep. 1955, *Asprey 2353* (NY); Queens Hwy., 13 Dec. 1970, *Plowman*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Pub. by S. Curtis, Walworth, Jan. 1827.
Swan Sc.

Figure 4. Lectotype of *Solanum coriaceum* (Hooker, 1827: tab. 2708). Image reproduced with permission of Botany Library, The Natural History Museum.

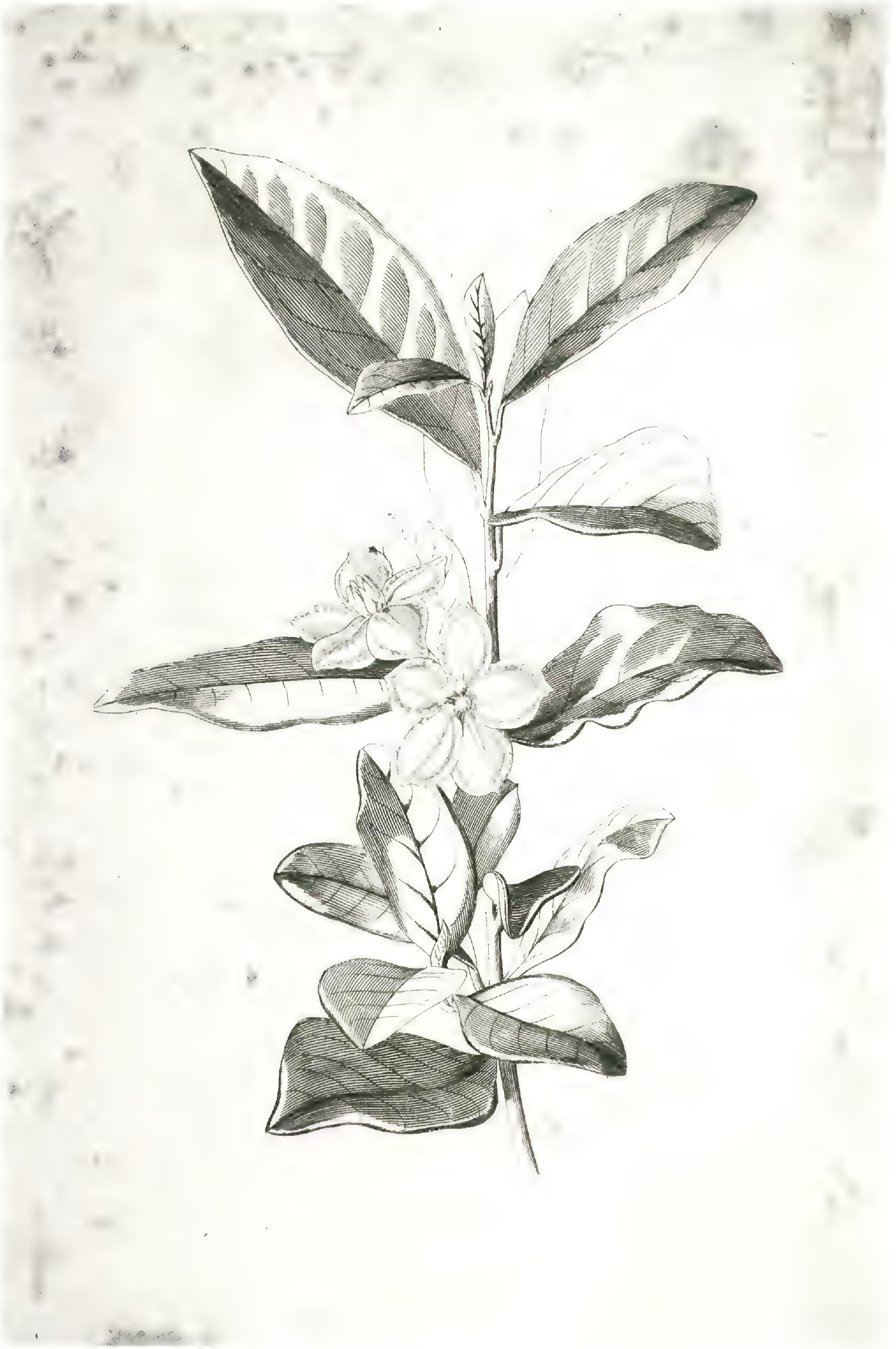


Figure 5. Lectotype of *Solanum myrtifolium* (Loddiges, 1828: pl. 1431). Image reproduced with permission of Botany Library, The Natural History Museum.

2986 (GH); along Queen's Hwy., about 2 mi. E of Rio Bueno, *Stearn 140* (BM, K). **Saint Elizabeth Parish:** Pepper, *Britton 1073* (NY); Font Hill, near Black River, Luana Point, *Britton 1511* (NY); Kaiser mine area S of Gutters, *Howard & Proctor 13765* (A, NY); Pepper, *Miller 1358* (US); Fort Charles, Feb. 1936, *Sangster s.n.* (BM); vic. of Merriman's Point, *Stearn 865* (BM). **Saint James Parish:** Orange River valley, 1/2 mi. SE of Sign, *Proctor 16625* (BM). **Saint Thomas Parish:** Great Morass, *Adams 11833* (MO); Holland Bay, *Purdie 135* (K). **Trelawny Parish:** near Rio Bueno along coast rd. to Duncane, *Plowman 3241* (A, K, US); White Bay, 4 mi. due E of Falmouth, *Proctor 23668* (BM); ca. 2 mi. W of Rio Bueno Harbour, *Stearn 319* (BM). **Westmoreland Parish:** Negril & vic., *Britton & Hollick 2058, 2063* (NY); Negril, *Harris 10231* (BM, F, K, NY, US), *Harris 10237* (K, NY).

4. **Solanum troyanum** Urb., Symb. Antill. 5: 487. 1908. TYPE: Jamaica. Trelawny Parish: Mt. Diablo, 29 Aug. 1905, *W. Harris 9000* (lectotype, designated here, BM 000849163!; isotypes, K 000005227!, NY 00111387!). Figures 2D, 6.

Slender shrubs to small trees, to 4 m; stems ± stout, erect, glabrous; bark very dark on new shoots, white on older stems, peeling and exfoliating in irregular patches; new growth completely glabrous, drying black; sympodial units plurifoliate. Leaves 4.5–16.5 × 1.5–6 cm, elliptic, thick and somewhat fleshy, shiny adaxially, matte abaxially, completely glabrous, drying dark, the base attenuate, the margins entire, slightly revolute, the apex acute; primary veins 6 to 9 pairs, drying reddish green; petioles 1–1.5 cm, glabrous. Inflorescences leaf-opposed on short terminal leafy shoots, 3–8 cm, simple or occasionally once-branched, with 3 to 10 flowers, glabrous, the peduncle 1.5–3 cm; pedicels 2–2.5 cm, stout and fleshy, 1–1.5 mm diam. at the base and the apex, ± erect at anthesis, articulated just above the base; pedicel scars 5–8 mm apart, the pedicels flush with the rachis or leaving a peg 0.5–1 mm; buds globose to ellipsoid, strongly exserted from the calyx tube. Flowers apparently all perfect; calyx tube 3–4 mm, broadly cup-shaped, glabrous, the lobes 5–6 mm, deltate and overlapping, minutely papillate on the tips and margins; corolla 3.5–6 cm diam., violet, intensely fragrant, lobed 1/4–1/2 of the way to the base, the lobes 0.5–2 cm, deltate and emarginate, enlarging with age as corolla expands, planar to somewhat campanulate at anthesis, densely white papillate at the tips; filaments with the free portion 2.5–3 mm, the filament tube less than 0.5 mm, glabrous; anthers 6–7 × 2.5–3 mm, poricidal at the tips, the pores not lengthening to slits with age; ovary conical, glabrous, the style ca. 15 mm, straight, glabrous, the stigma minutely capitate, the surface minutely papillate. Fruit a globose berry, ca. 1–1.5 cm diam. (immature), dark bluish green, the pericarp thin; fruiting pedicels 3–4 cm, 1.5–2 mm diam. at the base, woody, erect; seeds 4–5 × 2.5–3 mm, ovoid-reniform, pale tan, the surfaces minutely pitted, the testal cell margins sinuate. Chromosome number not known.

Distribution. Endemic to Jamaica, in moist crevices and hilltops on limestone, from 500–1000 m.

Discussion. Solanum troyanum is a spectacular plant with its large, purple flowers to 6 cm diam. and shiny dark green leaves. Like those of *S. havanense*, the flowers become larger through anthesis. *Solanum troyanum* is very similar to *S. havanense* but, in addition to having larger flowers, is glabrous on all vegetative parts, including the very young growth. *Solanum havanense* occurs along the coastal fringe on limestone, while *S. troyanum* is a mountain plant, growing in moist forests on slopes.

Solanum troyanum is assigned a preliminary conservation status (IUCN, 2001) of Vulnerable (VU) based on its narrow geographical range (< 20,000 km^2) and the length of time since the last specimen was collected (1976: Yoder, 2006), but its status as a single island endemic may warrant an assessment of Endangered (EN). Re-collection of *S. troyanum* is a high priority, and given its large, showy flowers, it is a potential candidate for ex situ conservation and propagation as an ornamental.

Three syntypes were cited by Urban in the original description (Urban, 1908): *Harris 8530, 8681*, and *9000*. The gathering *Harris 9000* from Mt. Diablo was chosen as the lectotype (BM, see Fig. 6) as it represents more complete flowering and fruiting material, and is distributed in three herbaria.

Additional specimens examined. JAMAICA. **Clarendon Parish:** vic. of Quaco Rock, vic. Ritchies, *Proctor 33808* (BM, MO). **Manchester Parish:** Banana Ground, *Adams 11230* (BM, MO); Christiana, 1/2 mi. NW of Christiana, *Howard & Proctor 14365* (A, BM); Coleyville, Gourie Forest, ca. 1 mi. due SW of Coleyville, *Proctor 31768* (F, MO). **Saint Ann Parish:** Douglas Castle Distr., *Proctor 26410* (BM, GH). **Saint Catherine Parish:** vic. of Hollymount, Mt. Diablo, *Maxon 2206* (NY, US [2]). **Saint Elizabeth Parish:** Mulgrave, along rd. betw. Mulgrave & Elderslie, *Proctor 20480* (BM). **Saint James Parish:** Sweetwater, 1 mi. S of Sweetwater, *Proctor 7980* (US). **Trelawny Parish:** Troy, 5.5 mi. NW of Troy, *Adams 12827* (BM); Troy, Cockpit country, *Britton 591* (NY); near Troy, *Harris 8530* (A, BM, NY), *Harris 8681* (NY [2]), *Perkins 1375* (GH); Island View Hill, Wilson Valley Distr., 1.5 mi. N of Warsop, *Plowman 3256* (A, K, US); Troy, *Proctor 9911* (NY); Island View Hill, Wilson Valley distr., 1.5 mi. N of Warsop, *Proctor 21339* (BM); Miss Laura's Hill, Wilson Valley distr., ca. 1 mi. N of Warsop, *Proctor 24845* (A, BM, NY, US); Burnt Hill, overhanging Donkey Trail, 1/2 mi. N of Burnt Hill intersection, *Read 1918* (BM, GH, US); Troy, Bartley's Run, near Troy (ca. 3 mi. NNW), *Stearn 922* (BM [2]); Island View Hill, N of Warsop, *Webster 13669* (BM); Burnt Hill, *Whitefoord 1399* (BM, F, MO).

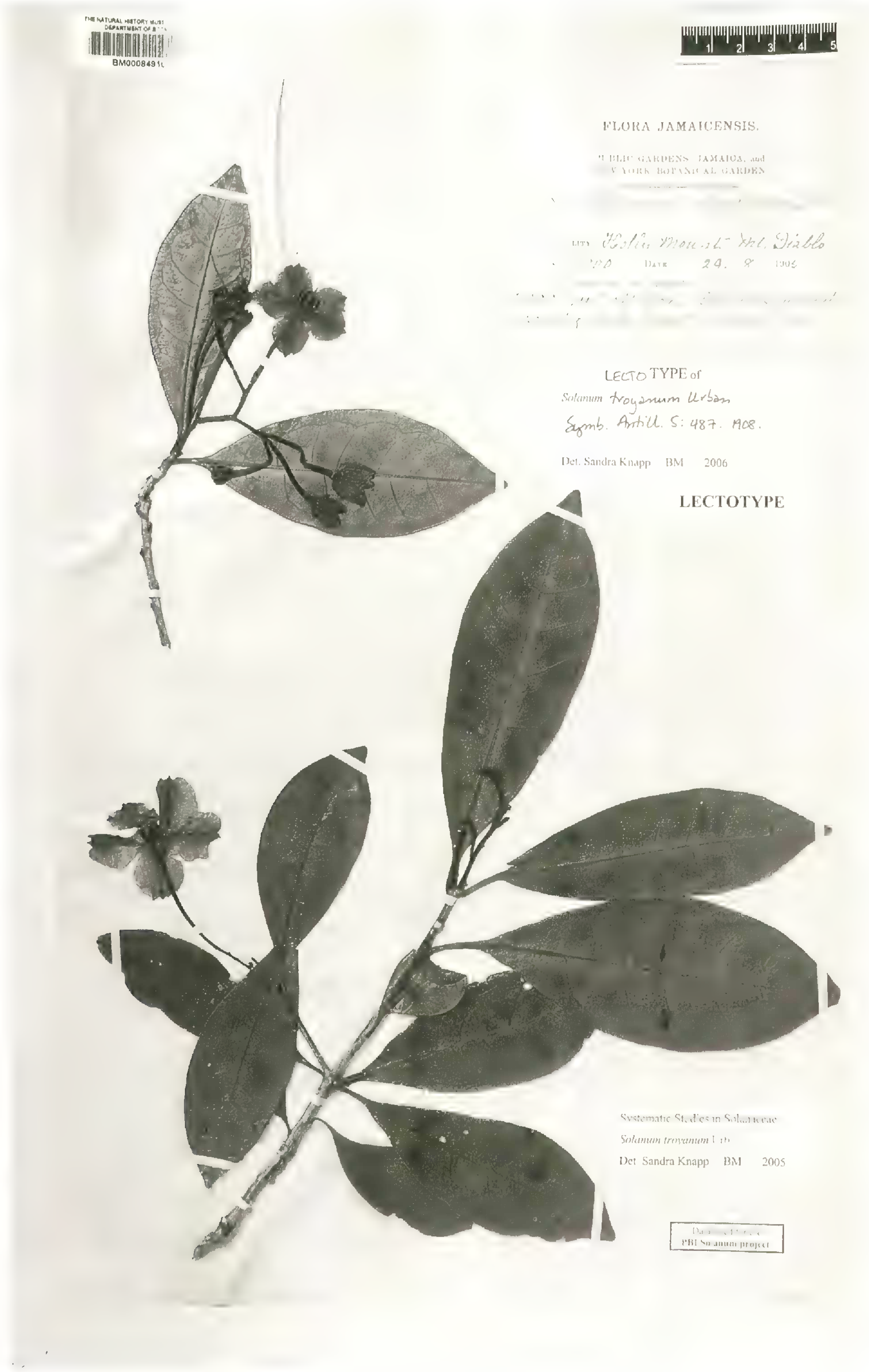


Figure 6. Lectotype of *Solanum troyanum* (*Harris 9000* [BM]).

ADDITIONS TO THE *SOLANUM PSEUDOCAPSICUM* SPECIES GROUP

Small shrubs, often with woody tap roots; young stems and leaves glabrous or densely pubescent, the trichomes either simple and uniseriate or dendritic; sympodial units difoliate, geminate, the minor leaves similar in shape to the major leaves, but usually smaller. Leaves simple, lanceolate to elliptic, glabrous to densely pubescent, the trichomes like those of the stems. Inflorescences opposite the leaves, usually simple but in some species many times branched. Flowers white, the calyx lobes deltate to leafy and relatively large, the corolla lobes and sepals reflexed at anthesis. Fruit an orange or red berry, soft and juicy at maturity; fruiting pedicels erect, thickened and woody; seeds flattened-reniform, pale yellowish brown, the surfaces pitted.

Distribution. Species of the group are widespread in dry habitats, from Mexico to Uruguay.

5. **Solanum argentinum** Bitter & Lillo, Repert. Spec. Nov. Regni Veg. 12: 547. 1913. TYPE: Argentina. Córdoba: prope Córdoba, *T. Stuckert 15164* (lectotype, designated here, CORD!; isotypes, G [2]!, LIL not seen). Figure 7.

Solanum argentinum Bitter & Lillo var. *chroniotrichum* Bitter, Repert. Spec. Nov. Regni Veg. 12: 549. 1913. *Solanum chroniotrichum* (Bitter) C. V. Morton, Revis. Argentine Sp. Solanum 183. 1976. TYPE: Argentina. Jujuy: s. loc., *T. Stuckert 21337* (neotype, designated by Morton, 1976: 183, CORD!; isotype, G!).

Shrubs (clonal?) to 2 m; stems erect, ca. 0.5 cm diam., sparsely to densely pubescent with uniseriate dendritic trichomes 0.25–1 mm, longer trichomes found in more densely pubescent populations, pubescence extremely variable and correlated over the entire plant; bark red or dark brown, very shiny; new growth sparsely dendritic pubescent like the stems; sympodial units (2)3-foliate, only occasionally geminate. Leaves (2–)3.5–15 × (0.6–)1–5.7 cm, elliptic to narrowly elliptic, adaxially glabrous to sparsely pubescent with uniseriate simple or dendritic trichomes 0.5–1 mm on the veins and lamina, abaxially glabrous to densely pubescent with uniseriate dendritic trichomes 0.5–1 mm over entire surface, the base attenuate, the margins entire, the apex acute to acuminate; primary veins 10 to 12 pairs, often drying yellowish green; petioles 0.3–1.2 cm, glabrous to densely dendritic pubescent. Inflorescences internodal or terminal, 2.5–10 cm, many times (to 6×) branched, with 50 to 200 flowers, sparsely to densely pubescent with dendritic trichomes, the pubescence less dense apically, the peduncle 2–4 cm; pedicels 0.5–0.6 cm, less than 0.5 mm diam. at the base and apex, nodding at anthesis, sparsely dendritic pubescent; pedicel scars closely packed distally, to 3 mm apart toward the base of the inflorescence, plane with the rachis; buds globose, the corolla exserted approximately halfway. Flowers all perfect; calyx tube ca. 1 mm, conical, the calyx lobes 1–1.5 mm, narrowly triangular, sparsely dendritic pubescent abaxially; corolla 0.8–1 cm diam., white, lobed ca. 3/4 of the way to the base, the lobes 0.5–0.8 cm, deltate, planar to slightly reflexed at anthesis, glabrous to densely papillate toward the apex abaxially; filaments with the free portion 1–1.2 mm, the tube essentially absent, glabrous; anthers 2–2.5 × ca. 1 mm, poricidal at the tips, the pores lengthening to slits with age; ovary conical, glabrous, the style 4–5 mm, straight, glabrous, the stigma capitate, the surface minutely papillate. Fruit a globose berry, 0.5–0.6 cm diam., bright orange or yellowish orange at maturity, the pericarp thin, the pulp sticky; fruiting pedicels 0.7–0.9 cm, ca. 2 mm diam. at the base, swollen just below the berry, ca. 1 mm diam. at the apex, woody and erect; seeds 6 to 8 per berry, 3–3.5 × 2–2.5 mm, flattened-reniform, pale yellowish tan, the surfaces minutely pitted. Chromosome number $n = 12$ (Moscone, 1992).

Distribution. Bolivia, Argentina, and Paraguay, primarily a species of Chaco habitats, but in many secondary habitats in a wide range of elevations from 100–3000 m.

Common names. Argentina. "hedionillo del monte" (*Lorentz & Hieronymus s.n.*); Salta: "cabia yuyu" (*Cozzo 77*); Santiago del Estero: "afata" (*Gramaja 16*); Tucumán: "runa-yuyu" (*Stuckert 18156*). Bolivia. Santa Cruz: "amarguillo negro," "yacurembiú" (*Vargas 1052*). Paraguay. Presidente Hayes: "cabara yuyo" (*Soria 364*).

Discussion. I excluded *Solanum argentinum* from section *Geminata* based on its complex, branched inflorescence, and thought it was possibly more closely related to members of *Solanum* sect. *Holophylla* s. str. such as *S. aligerum* Schltdl. (Knapp, 2002a). Analyses of DNA sequences (Bohs, 2005; Weese & Bohs, 2007) show that *S. argentinum* is firmly embedded in the Geminata clade, and that it is apparently close to *S. pseudocapsicum* L. and its relatives. Closer analysis of inflorescence morphology revealed that *S. argentinum* lacks the distinctive platform pedicel base morphology of *S. aligerum* and relatives (see Knapp, 1989), and that the inflorescence, despite its highly branched character, is similar to those elsewhere in the Geminata clade. *Solanum argentinum* shares with other members of the *S. pseudocapsicum* species group (sensu Knapp, 2002a) brightly colored fruit with red or orange

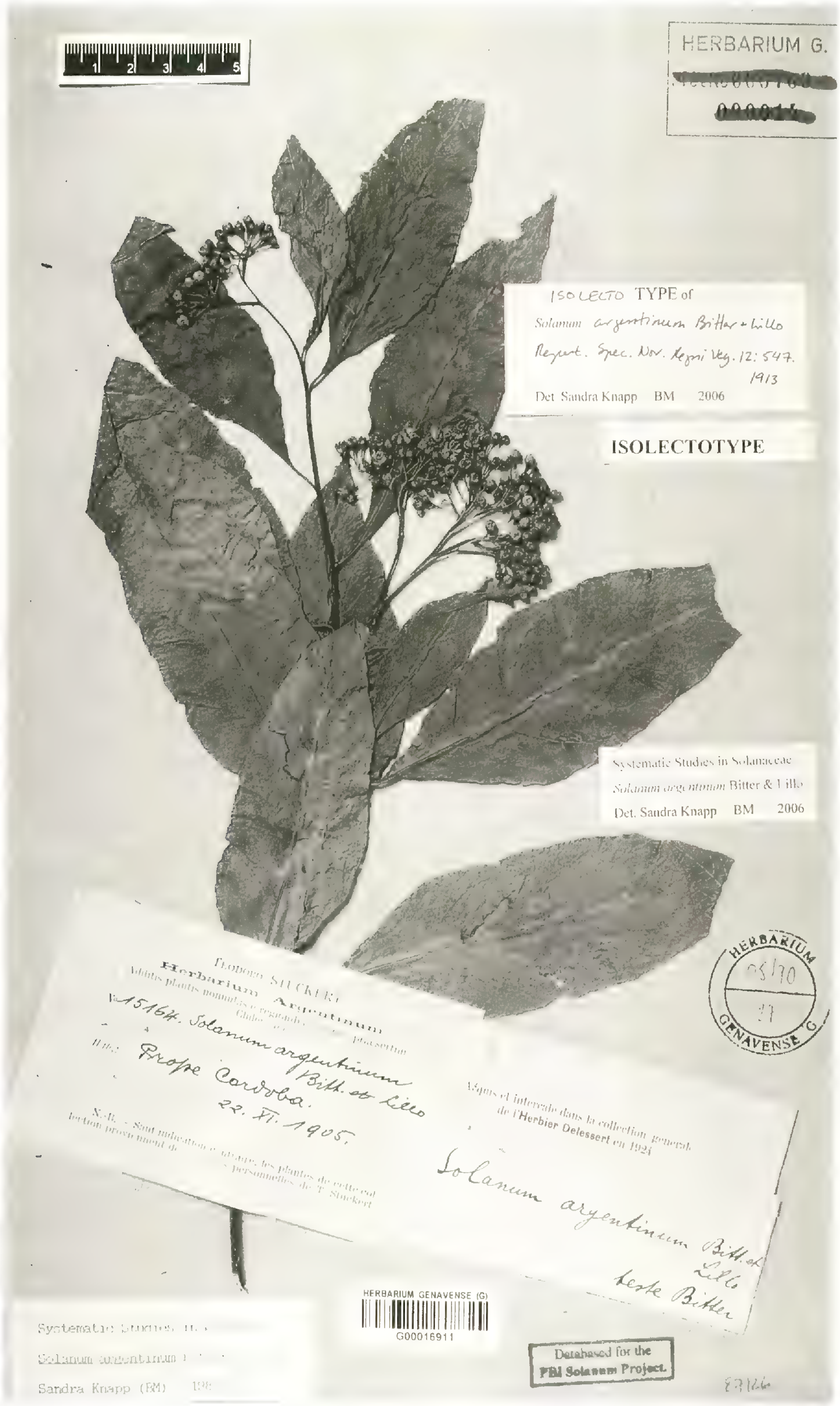

HERBARIUM G.
ISOLECTO TYPE of
Solanum argentinum Bitter + Lillo
Repert. Spec. Nov. Regni Veg. 12: 547. 1913
Det Sandra Knapp BM 2006
ISOLECTOTYPE
Systematic Studies in Solanaceae
Solanum argentinum Bitter & Lillo
Det. Sandra Knapp BM 2006
Herbarium Argentinum
15164. Solanum argentinum Bitt. et Lillo
Prope Cordoba.
22. XI. 1905.
de l'Herbier Delessert en 1924
Solanum argentinum Bitt. et Lillo teste Bitter
HERBARIUM GENAVENSE (G)
G00016911
Databased for the PBI Solanum Project.
Sandra Knapp (BM)

Figure 7. Isolectotype of *Solanum argentinum* (*Stuckert 15164* [G]).

pericarp, yellow, flattened seeds, and pedicels that are nodding in flower and erect in fruit.

Individual plants of *Solanum argentinum* vary enormously in pubescence density, from nearly glabrous to densely pubescent over the entire abaxial leaf surface. This variability in pubescence density led to the description of the two taxa now synonymized under *S. argentinum*. Rigonatto et al. (2005) examined trichome and leaf surface morphology along the range of pubescence densities and found no differences that would lead them to regard them as different taxa, even at the subspecific level. Pubescence density may also vary in response to environmental variables such as aridity or elevation. To test this possibility, I scored mature leaves (four leaves below the growing tip of a shoot) into three classes of pubescence density on 160 geo-referenced specimens with elevation recorded (see Appendix 3) from throughout the species range. Each duplicate of a given collection was scored separately, as some collections were obviously not from the same plant (i.e., they were very different in pubescence density). The scoring was a simple three-point scale: 1 = glabrous, 2 = tufts of trichomes in the vein axils, 3 = pubescence on the entire lamina. The data are displayed as box plots in Figure 8. No effect of latitude, longitude, or altitude was apparent, and the confidence limits of each pubescence class overlapped for each environmental variable (see Fig. 8). Local populations of *S. argentinum* are often composed of large continuous patches of plants of identical pubescence density. My observations of populations in eastern Bolivia (e.g., *Nee et al. 51722, 51723*) suggest to me that the species may be clonal, or spreading through underground connections. This, however, has not yet been investigated.

Solanum argentinum is a widespread and weedy species. It can be assigned a preliminary conservation status (IUCN, 2001) of Least Concern (LC).

Bitter and Lillo (Bitter, 1913) cited 16 collections in their original description, most of which were listed without herbaria. Those that were identified as being in a particular herbarium were either from Berlin, herbarium Hieronymous (subsequently held at Berlin) or herbarium Stuckert (now at G). Morton (1976) identified potential lectotypes in CORD, but did not lectotypify *Solanum argentinum*, as he had not seen material from Teodoro Stuckert's herbarium in Geneva at the time he was writing his treatment of Argentine *Solanum*. I have chosen *Stuckert 15164* as the lectotype of *S. argentinum*, the specimen in G is annotated in Bitter's hand, and duplicates are in CORD and LIL (fide Morton). I have chosen the lectotype as the specimen in CORD so as to place the type of this species in its country of origin.

Additional specimens examined. ARGENTINA. ca. Tapia, *Baer 110* (G); Río Juramento, 1972, *Morton s.n.* (MO, US); FAQIA, *Rodriguez 21* (US); s. loc., *Stuckert 8896* (G); Capital Federal, Villa Ortúzar, cult. Hort. Bot. Fac. Agr. y Vet, *Weisz BAA5761* (US). **Catamarca:** Desmonte, *Bartlett 19631* (US); Santa Rosa, *Brizuela 166* (W); Dept. La Paz, Aibas, *Brizuela 523* (MO); Dept. La Paz, El Aibal, *Brizuela 744* (G, W); Dept. La Paz, El Lindero, *Brizuela 893* (MO); Dept. La Paz, El Divisadero, *Brizuela 1145* (G); Dept. Ancasti, El Carrizal, *Brizuela 1334* (W); Dept. Paclín, La Merced, *Pierotti s.n.* (US); Dept. Santa Rosa, Lavalle, *Quintero 63* (MO); Dept. Paclín, Superi, *Risso 156* (MO); Dept. Paclín, La Merced, *Risso 239* (W); Dept. Paclín, La Merced, Río Paclín Nte, *Risso 295* (NY). **Chaco:** Avia Terai, *Aguilar 161* (W); Dept. Napalpí, Presidencia Roque Saenz Peña, *Buratovich 446* (G); Dept. Resistencia, Fortin Cardoso, *Malvárez 1335* (W); Dept. Resistencia, Cote Lai, *Malvárez 1401* (MO); Dept. 1 de Mayo, Colonia Benítez, *Schulz 3839* (F); Dept. Tapenaga, Enrique Urién, *Schulz 8170* (US); Dept. Maipú, Ruta 95, ruinas Km 75 al N de Saenz Peña, *Schulz 15635* (F); Colonia Benítez, *Schulz 15825* (F), *Schulz 17038* (F). **Córdoba:** Gutenberg, Ferrocarril Central de Argentina, *Bartlett 19888* (US); Dept. Ischilin, Quilino, *Meyer 13127* (W); Dept. Río Seco, along Hwy. 9, *Nee 50736* (NY); Villa Maria, *Stuckert 16820* (G); Cruz del Eje, *Stuckert 17237* (G); Dept. Ischilin, Quilino, *Villafañe 74* (US). **Corrientes:** s. loc., *Burkart 2585* (G), *Pedersen 2585* (MO, US); Corrientes, near Facultad de Agronomia, *Plowman 2729* (F, US). **Formosa:** Río Pilcomayo, barrancas a la altura del Campamento Central, *Cordini 67* (US); comun Ric. 83, *Jorgensen 2622* (MO, US); Dept. Pilagás, SE a 3 km de Espinillo, *Morel 7268* (US); Dept. Pilagás, Espinillo, *Morel 7350* (W); Dept. Bermejo, Nuevo Pilcomayo, *Pierotti 4012* (F, NY, US); Dept. Bermejo, Laguna Yema, alrededores de Laguna Yema, *Vanni et al. 4334* (NY). **Jujuy:** alrededores de la ciudad, *Araque M. & Barkley 19Ar482* (W); La Esperanza Estate, San Pedro de Jujuy, *Bartlett 20321* (US); Sierra de Zapla, *Burkart 12017* (MO); Dept. Santa Bárbara, entre El Sauzal y Palma Sola, *Cabrera et al. 31020* (F); Dept. Santa Bárbara, Aguas Calientes, *Cabrera et al. 31427* (MO); Dept. El Carmen, Perico, Río Perico, *Krapovickas & Cristóbal 17526* (US); Dept. El Carmen, Las Lajitas, *Krapovickas et al. 56552* (MO); Perico, *Lillo 9837* (US); Dept. Valle Grande, ca. 0.5 km from Huacanqui on rd. from San Francisco to Valle Grande, ca. 7.5 km N of San Francisco, *Nee & Bohs 50828* (NY). **Salta:** Joaquín V. González, *Aguilar 304* (BM); Dept. Anta, Joaquín V. Gonzalez, *Alvarez 226* (US); vic. of the dam (El Dique), Coronel Moldes, *Bartlett 19683* (US); Dept. Orán, Ballivián–Agua Linda, *Borsini 744* (W); Dept. Orán, Puesto de Agua Tranquila, *Borsini 6721* (W); Dept. Cafayate, ca. 5 km W de Cafayate, Río Colorado, *Charpin & Novara 20717* (G, US); Dept. La Viña, ruta 68, Km 110, ca. El Hongo, *Charpin & Lazare 23928* (G [2]); Dept. La Viña, Salamancha, bords de la ruta 48, *Charpin 25819* (G [2]); Dept. Orán, Embarcación, *Comision para la Medicion de un Arco de Meridiano 896* (F); Orán, alrededores, *Cozzo 77* (US); Dept. Capital, Km 34 al E de Salta, *Descole 1494* (W); Dept. Cafayate, Cafayate, *Hayward 2078* (US), 19 Oct. 1948, *Fries s.n.* (MO); s. loc., *Herb. Hoehne 38942* (US); Dept. Metán, Río Piedra, *Huidobro 536* (US); Río Pasaje Juramento, *Huidobro 617* (US); Dept. La Viña, Coronel Moldes, *Hunziker 1064da* (US); Dept. Rosario de la Frontera, Talayaco, 28 km E de Rosario de la Frontera, ruta 34, *Krapovickas et al. 28017* (MO); Dept. Rosario de Lerma, Cerrillos, *Krapovickas et al. 28397* (MO); Dept. San Martín, 16 km W de Gral. Ballivián, orilla de arroyo afluente del Río Seco, *Krapovickas & Schinini 30909* (F, MO); Dept. San Martín, Campo Durán,

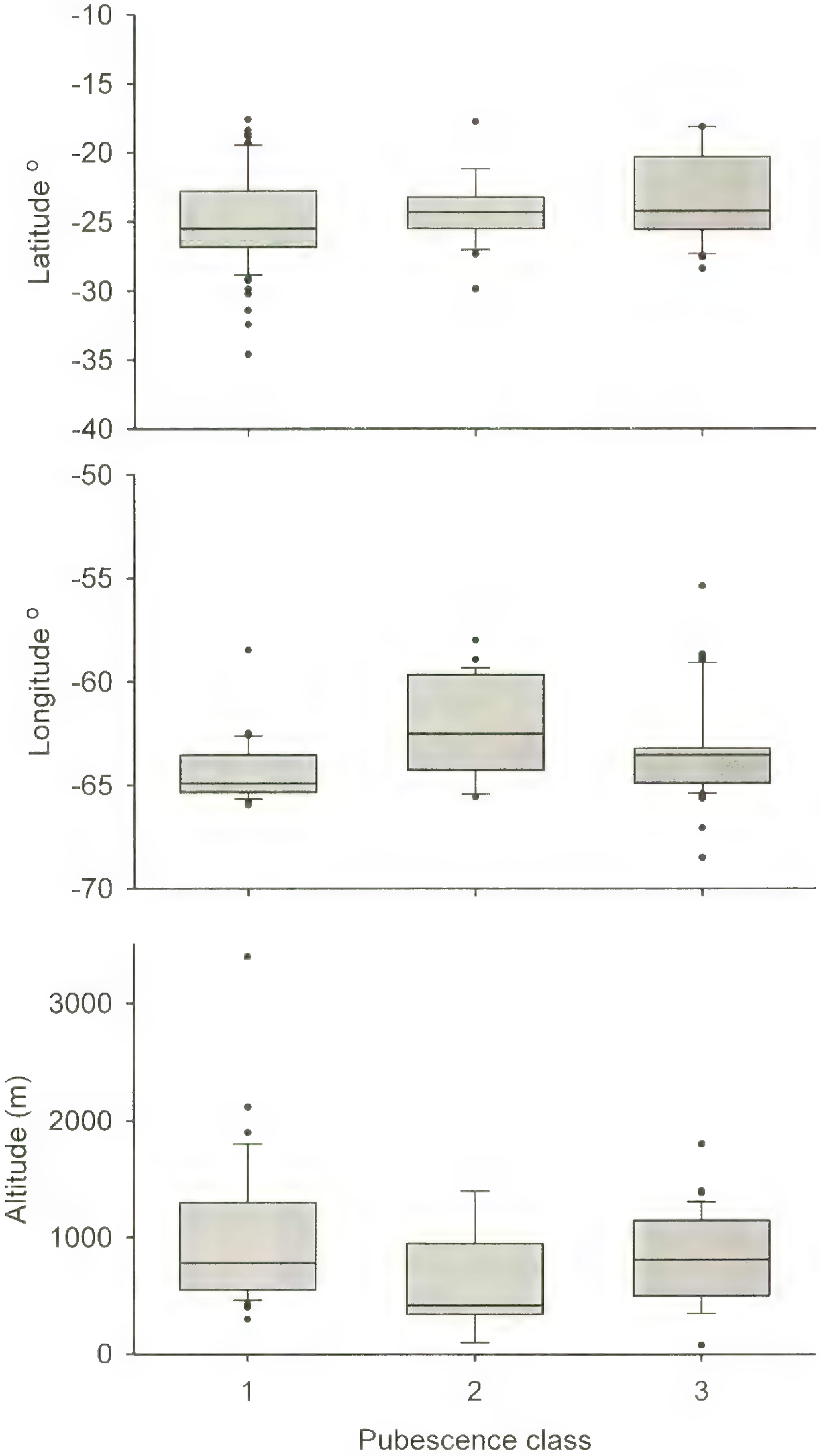


Figure 8. Environmental distribution of pubescence classes in *Solanum argentinum*. Box plots of the three classes of pubescence (1 = glabrous, 2 = tufts in vein axils, 3 = pubescence uniformly distributed on lamina) are plotted against latitude, longitude, and altitude above sea level. The central box in each class represents the central 50% of the data (with the median shown as a line). The outer bars represent 90% of the data, with the remaining 10% shown as outlying points. The figure shows that each of the three pubescence classes overlaps strongly in all three geographic dimensions. In each case, Kruskal-Wallis tests suggest that the medians do not differ ($P > 0.05$).

Río Itiyuro, *Krapovickas & Schinini 39269* (G); Dept. Capital, 20 km E de Salta, ruta Salta a Gral. Güemes, *Krapovickas & Cristóbal 30423* (G); Dept. Anta, 17 km NE de J. V. Gonzalez, camino a Puerta Blanca, *Krapovickas & Cristóbal 46303* (NY); Dept. Anta, 1ra. sección, El Dorado, *Luna 1049* (MO); Dept. Metán, Metán, *Malvárez 155* (G); Dept. Anta, Ceibalito, *Malvárez 305* (W); Dept. Orán, Senda Hachada, *Malvárez 497* (W); Dept. Capital, Capital, *Meyer 3663* (F); Dept. Cerrillos, Cerrillos, *Meyer 3652* (F); Dept. Anta, León Pozo, 30 km al W de Piquete Cabodo, *Meyer 9900* (BM, F, NY); Dept. Orán, Orán, *Meyer 5048* (F); Dept. Anta, Coronel Olleros, *Novara 527* (G [2], MO); Dept. Capital, Salta, sobre el FFCC a Quijano a la altura de calle Leguizamón, *Novara 535* (G); ruta 68 km 83 entre Alemanía y el Guayacán, *Novara 4572* (G); Dept. Guachipas, Alemanía, alrededores del pueblo, *Novara 4856* (G [2]); Dept. La Viña, Talapampa, en los alrededores de la hostería, ruta 68 Km 93, *Novara 5625* (G [2]); Dept. Capital, Chachapoyas, Sierra de Vélez, cerros de la Universidad Católica, *Novara 5892* (G [2]); Dept. La Viña, adyacencias del digue Puerta de Diaz, 4–6 km al W de Coronel Moldes, *Novara 7248* (G); Dept. Cerrillos, Finca Santa Margarita, Ruta 21, 4 km al N de San Agustin, *Novara 7755* (G [2]); Dept. Orán, Orán, *O'Donell 3135* (BM); Dept. Campo Santo, antes de Cabeza de Buey, *O'Donell 4357* (MO); Dept. Orán, Orán, *Pierotti 2* (F); Dept. Rosario de Lerma, Quebrada del Toro, *Ruthsatz 364/2* (MO); Dept. Anta, El Piquete, *Ragonese 274* (US); Talavera, *Schulz 2041* (NY); Dept. Chicoana, Dique Cabra Corral, en las Serranas del Dique, *Varela 1545* (NY); Dept. Guachipas, Alemania, *Venturi 9818* (BM, MO, US). **Santa Fé:** Dept. 9 de Julio, entre El Boliche del Turco y el Gato Colorado, *Ragonese 3000* (US). **Santiago del Estero:** betw. Brea Pozo and Río Huayco Hondo, Ferrocarril Central de Argentina, *Bartlett 19750* (US); Dept. Robles, Vilmes, *Bartlett 20474* (US); Dept. Capital, Capital, *Bianchi 12* (F, W); Dept. Silípica, El Mojón, *Gramaja 16* (BM, US); Dept. Capital, Mal Paso, *Huidobro 3045* (W); Dept. Robles, Fernandez, *Krapovickas 27157* (G, MO); Dept. Pellegrini, El Tigre, *Luno 24* (W); Dept. Robles, Turena, *Maldonado 227* (F, US); Dept. Copo, Urutaú, *Malvárez 653* (MO); Dept. Copo, Pampa de Los Guanocos, *Malvárez 691* (W); Dept. Guasayán, El Cevilas, Mar. 1944, *Pierotti s.n.* (US); Dept. Pellegrini, Estancia El Remate, *Venturi 5797* (BM, F, MO, US). **Tucumán:** El Molle, *Castellanos 14825* (US); Dept. Leales, Los Puestos, *Krapovickas & Cristóbal 27143* (MO); Dept. Capital, s. loc., *Lillo 3343* (G [2], US); rd. Tucumán to Racas, railroad bridge in open country, *Mexia 4341* (MO), *Mexia 7834* (BM, MO, US); Burruyacú, Taruca Pampa, Finca San Augine, *Norrbom 91A3* (US); Dept. Cruz Alta, Las Cejas, *O'Donell 4321* (NY); Dept. Leales, Las Enuncijadas, *Ousset 112* (F); Tapia, *Rodriguez 249* (W); s. loc., *Stuckert 8170* (G); Dept. Burruyacú, s. loc., *Stuckert 18156* (G), *Stuckert 19721* (G); Dept. Capital, Muñecas, *Venturi 2434* (US); Dept. Trancas, Vipos, *Venturi 2655* (US); Dept. Trancas, Leocario Paz, *Venturi 7774* (US); Dept. Burroyacu, Cerro del Campo, *Venturi 7857* (MO, US). BOLIVIA. **Chuquisaca:** prov. Azero, 5 km N de Carandaytí, *Krapovickas 31246* (MO); prov. Oropeza, Chataquila, *Murguia 379* (NY); prov. Luis Calvo, proximo al lugar de el Palmar, *Murguia R. 536* (NY); prov. Luis Calvo, El Salvador, zona central, *Penseiro 4323* (MO, NY). **Gran Chaco:** Cururenda, 200 m, *Cárdenas 2525* (US [2]). **Santa Cruz:** prov. Cordillera, Santa Cruz, ca. 200 km hacia el S, Proyecto Abapó Izozóg, cerca al Río Grande, *Beck 6459* (NY); prov. Cordillera, Aguarati Izozog, en las grandes dunas del Río Parapetí, 500 m al S de Aguarati, *Bourdy 2017* (NY); prov. Cordillera, Camiri, *Cárdenas et al. 4754* (US); prov. Chiquitos, 7 km al E de la planta de gas de Río Grande, sobre la brecha del gasoducto, *Fuentes & Novarro 1958* (MO); prov. Cordillera, Cuevo, adentro la sierra cerca la planchada antigua de Chevron, *Jardim & Roas-Hurtado 1550* (NY); prov. Cordillera, Boyuibe, del Pueldo, 11 km N del Pueblo, *Killeen et al. 4209* (NY); prov. Cordillera, 3 km NW from Camiri, *Kuroiwa & Maeda 2332* (NY); prov. Cordillera, Alto Parapetí, orilla del Río Parapetí, *Michel 2* (MO, NY); prov. Cordillera, E & NE sides of Camiri, along Río Parapetí, *Nee 35288* (NY); prov. Cordillera, 2–3 km NW of Boyuibe, along abandoned railroad to Cuevo, *Nee 35317* (MO, NY); prov. Cordillera, in Boyuibe, *Nee 35330* (NY); Prov. Andrés Ibáñez, city of Santa Cruz, *Nee 40420* (MO, NY); Prov. Andrés Ibáñez, Basilio, on rd. from Santa Cruz to Camiri, *Nee 44597* (BM, MO, NY, US); prov. Cordillera, around hwy. and railroad bridges over Río Seco on N side of settlement of Río Seco, along new hwy. from Santa Cruz to Abapó, *Nee 49083* (NY); prov. Cordillera, 6 km (by air) S of center of Camiri, along dirt rd. to Comunidad Yuti, *Nee 51132* (G, NY); prov. Cordillera, 2 km SW of center of Camiri, on SW side of Camiri, *Nee 51149* (NY); prov. Cordillera, 7 km S of Salinas on hwy. from Camiri to Cuevo, *Nee 51171* (NY); prov. Cordillera, along rd. from Camiri to Ipatí, 18.5 km N of bridge over Río Parapetí on N side of Camiri, *Nee 51320* (G [2], NY,); prov. Cordillera, along rd. from Camiri to Ipatí, 9.5 km N of bridge over Río Parapetí on N side of Camiri, *Nee 51337* (NY); Prov. Andrés Ibáñez, Basilio, *Nee et al. 51722* (BM, G [2], NY); prov. Cordillera, S side of bridge over Río Seco in town of Río Seco, *Nee et al. 51723* (BM, NY); prov. Florida, along hwy. from Mairana to Mataral, 3 km NE of bridge at Los Negros, *Nee et al. 52101* (BM); prov. Cordillera, La Brecha, Bañados de Izozog, alrededores del hospital y 3 km camino hacia Río Parpetí, *Vargas 1052* (MO, NY). **Tarija:** prov. Avilés, Sunari Pampa, cerca Colon N, *Bastian 1347* (NY); prov. Arce, 31 km S of jct. of rd. to Entre Ríos, on rd. to Padcaya, *Solomon 10579* (MO, US); ca. 25 km S of Tarija toward Padcaya, *Wood 9529* (NY). PARAGUAY. Jardín Botánico, *Rojas 14486a* (W). **Alto Paraná:** Río Atabó, *Itaipú Binacional 668* (MO). **Boquerón:** Puesto Uno, Pozo Hondo, a orillas de Río Pilcomayo, *Degen & Mereles 3149* (FCQ, MO [2]); a 22 km sobre Picada Mistolar de la Picada 4ta. División de Infantería, Pedro P. Peña, *Degen & Mereles 3176* (FCQ); zona del canal Paraguayo, en el Pilcomayo, *Degen & Mereles 3179* (MO); Pozo Hondo, orillas del Río Pilcomayo, *Mereles & Degen 5570* (FCQ, MO); Tyto. Misión-Estancia Oasis, 6 km S del desvío a Pozo Hondo, *Mereles & Degen 5616* (FCQ); entrada al Puesto de Buenos Aires, *Mereles & Degen 5642* (FCQ, MO); Estancia María Esther, borde de la Cañada Madrid, *Mereles & Degen 5859* (FCQ); cercanías del Río Pilcomayo, *Mereles & Degen 6114* (FCQ); Avalo Sanchez-Estancia Brusquetti, *Soria 364* (FCQ); Retiro Aloncito (Estancia Tinfunque), Campo Montaño, 12 km al N del Retiro Avalos Sanchez, *Spichinger RS2185* (FCQ); Estación Experimental Isla Poí, *Vanni et al. 2362* (NY). **Presidente Hayes:** de Pozo Colorado versus Fortin Gen. Díaz, *Bernardi 20283* (MO, NY); Estancia Bruschetti Avalos Sánchez, *Soria 364* (FCQ, MO).

6. Solanum delicatulum L. B. Sm. & Downs, Phytologia 10: 424. 1964. TYPE: Brazil. Santa Catarina: Itajaí, Cunhas, 10 m, 8 Feb. 1955, *R. Klein 1131* (holotype, HBR not seen; isotype, US 00027002 [fragm.]!]).

Solanum pavimenti L. B. Sm. & Downs, Phytologia 10: 428. 1964. TYPE: Brazil. Santa Catarina: Papanduva, Lejeadinho, 800 m, 3 Jan. 1962, *P. Reitz & R. Klein 11438* (holotype, US!; isotypes, HBR not seen, NY!).

Herbs to subshrubs to small shrubs 0.5–1.5 m; stems slender and erect, ± densely pubescent with a mixture of simple and branched (dendritic) uniseriate trichomes ca. 0.5 mm, the trichomes closely appressed and ascending; bark pale yellowish; new growth densely pubscent like the stems with a mixture of simple and branched trichomes, especially on the veins; sympodial units difoliate, usually geminate, but occasionally the leaf pair distant, some nodes occasionally trifoliate. Leaves adaxially glabrous to sparsely pubescent on the veins and lamina with a mixture of simple and dendritic trichomes ca. 0.5 mm, abaxially sparsely to densely pubescent on the veins, more sparsely pubescent on the lamina, the trichomes simple or furcate-dendritic, ca. 0.5 mm; major leaves 3–7 × 1.4–3 cm, elliptic to ovate, the base acute, the margins entire, the apex acute; primary veins 6 to 7 pairs, drying yellowish; petioles 0.4–1 cm, glabrous to sparsely pubescent; minor leaves 1.5–2 × 1–1.6 cm, similar in shape to the major leaves but usually somewhat more orbicular, the base acute, the margins entire, the apex acute; petioles 0.2–0.4 cm. Inflorescences internodal or somewhat leaf-opposed, 0.2–0.5 cm, simple, with 2 to 3 flowers, sparsely pubescent with a mixture of trichomes like those of the stems, the peduncle 0.1–0.2 cm; pedicels 0.5–0.6 cm, less than 0.5 mm diam. at the base, ca. 1 mm diam. at the apex, nodding at anthesis; pubescent with simple and dendritic trichomes like those of the stems and inflorescences; pedicel scars closely spaced, overlapping at the tip of the inflorescence, plane with the rachis; buds globose, the corolla included in the calyx lobes. Flowers all perfect; calyx tube 1–1.5 mm, open-conical, the lobes 2–2.5 mm, long-triangular, sparsely pubescent with simple uniseriate trichomes; corolla 0.9–1 cm diam., white, lobed ca. 3/4 of the way to the base, the lobes 0.7–0.9 cm, deltate, planar to slightly reflexed at anthesis, glabrous or sparsely pubescent with scattered trichomes along the petal midveins and tips adaxially; filaments with the free portion ca. 0.5 mm, the tube less than 0.5 mm, glabrous; anthers 2–2.5 × ca. 1 mm, poridical at the tips, the pores lengthening to slits with age; ovary conical, glabrous, the style 4–5 mm, straight, glabrous, the stigma 2-lobed to bifid, the surfaces minutely papillate. Fruit a globose berry, 1–1.2 cm diam., red-orange at maturity, the pericarp thin and brittle; fruiting pedicels 0.5–0.7 cm, ca. 1 mm diam. at the base, woody and erect; seeds 3–4 × 2–3 mm, flattened-reniform, yellowish tan, the margins thickened, the surfaces minutely pitted. Chromosome number not known.

Distribution. Brazil (Santa Catarina and São Paulo), Argentina (Misiones and Corrientes), and eastern Paraguay (fide Gutiérrez et al., 2006), forests and forest edges at ca. 800 m.

Common name. "Canema mirim" (Smith & Downs, 1966).

Discussion. *Solanum delicatulum* was excluded from section *Geminata* (it was thought to be a member of section *Solanum* or a related group), and its synonym *S. pavimenti* included in the synonymy of *S. pseudocapsicum* by Knapp (2002a). Subsequent morphological studies of this rare species by L. A. Mentz (Mentz & Oliveira, 2004) have shown that it is a member of the section, and a member of the *S. pseudocapsicum* group with bright red fruit, and pedicels nodding in flower and erect in fruit. Some authors (G. E. Barboza, pers. comm.; Gutiérrez et al., 2006) regard *S. pavimenti* and *S. delicatulum* as distinct based on a suite of fruit and leaf characters that I think are part of the overall variation in *S. delicatulum*.

Studies by Gutiérrez et al. (2006) show that *Solanum delicatulum* is relatively widespread in Argentina and Brazil and occurs sporadically in eastern Paraguay, although I have seen no Paraguayan material. It is a plant of understory in forests and along streams, and can be assessed as Near Threatened (NT) or Vulnerable (VU), depending upon the circumscription of the species (as including *S. pavimenti*, as defined here or excluding it, as delimited by Gutiérrez et al., 2006).

Additional specimens examined. ARGENTINA. **Corrientes:** Dept. Berón de Austral, Berón de Austral, segunda S. Rural, *Ibarrola 3854* (W). **Misiones:** Arroyo Uruguaí, Km 10, *Partridge 61701* (US); Dpto. Gral. Manuel Belgrano, Parque Prov. Uruguaí, Ruta Prov. 19, 50 km de Wanda camino a Deseado, margen del Río Uruzú, *Morrone et al. 1951* (MO). BRAZIL. **São Paulo:** São Paulo, Parque do Estado, grounds of the Instituto de Botânica, 10 km S and 2.2 km E of center of São Paulo, Praça da Sé, *Eiten & Clayton 5790* (NY); Cidade Jardim, *Hoehne* (*SPF 10696*) *s.n.* (NY); Cidade Jardim, *Hoehne* (*SP 44929*) *s.n.* (NY).

ADDITIONS TO THE *SOLANUM NUDUM* SPECIES GROUP

Shrubs, treelets, or small trees; young stems and leaves glabrous or pubescent, the trichomes simple or occasionally furcate or dendritic, often only on one side of the stem; sympodial units difoliate, usually geminate, usually anisophyllous. Leaves simple, elliptic to lanceolate, glabrous or pubescent, often with tufts of trichomes in the axils of the main veins abaxially, the trichomes simple or occasionally dendritic. Inflorescences opposite the leaves, usually simple, occasionally branched, glabrous or pubescent. Flowers white or greenish white, sometimes fleshy, the calyx lobes large and leafy to deltate, the corolla lobes planar or slightly reflexed at anthesis; anthers usually quite stout. Fruit a green, hard berry, becoming yellowish at maturity; fruiting pedicel woody, deflexed; seeds flattened-reniform, pale tan to yellow.

Distribution. Members of the species group are often widespread in secondary habitats through the Neotropics, but some species are more local and occupy primary forest habitats.

7. **Solanum chalmersii** S. Knapp, Brittonia 58: 330. 2006. TYPE: Bolivia. La Paz. Prov. Sud Yungas: 7.5 km (by rd.) from Huancané on rd. to San Isidro, moist montane forest, 16°21′S, 67°30′W, 2225 m, 10 May 2001, *M. Nee, L. Bohs, S. Knapp & J. M. Mendoza F. 51777* (holotype, LPB!; isotypes, BM!, NY!, USZ!).

Shrubs or small trees 2–6 m tall; young stems and leaves densely white pubescent with simple, uniseriate trichomes ca. 1 mm, composed of 2 to 5 cells; older stems remaining densely white pubescent, occasionally glabrate; bark of the older stems and trunks pale yellowish white; sympodial units unifoliate or difoliate and geminate. Leaves elliptic to narrowly elliptic, chartaceous, evenly pubescent adaxially with simple uniseriate trichomes ca. 1 mm, densely pubescent abaxially with white uniseriate trichomes 1–1.5 mm, the trichomes denser on the veins; major leaves 9–17 × 3–6 cm, the base acute, the margins entire, the apex acute, rounded at the very tip; minor leaves 1.5–3 × 1–2 cm, differing from the major ones only in size, but occasionally somewhat rounder in outline; primary veins 9 to 12 pairs, raised adaxially, prominent and yellowish green abaxially; petioles 0.3–0.7 cm in major leaves, ca. 0.5 cm in minor leaves, densely pubescent. Inflorescences 1.5–5 cm, opposite the leaves or occasionally somewhat internodal, unbranched, with 10 to 20 flowers, densely white pubescent with simple uniseriate trichomes 0.5–1.5 mm, the peduncle 1–3 cm; pedicels 1–1.2 cm, tapering from the abrupt base of the calyx tube to a slender base 0.5–0.8 mm diam., articulated at the base; pedicel scars closely packed, often overlapping; buds when very young appearing globose, the corolla soon exserted from the calyx lobes, the buds later becoming obovoid just before anthesis. Flowers all perfect; calyx tube 1–1.5 mm, the lobes ca. 1 × 1 mm, deltate to broadly triangular, abruptly constricted to an elongate tip ca. 0.5 mm long, densely pubescent with simple, uniseriate trichomes like those of the rest of the inflorescence; corolla 1.5–2 cm diam., stellate, lobed 2/3 to 3/4 of the way to the base, white or sometimes tinged purplish, the lobes ca. 1 × 0.5 mm, ovate-lanceolate, reflexed at anthesis, densely and evenly pubescent abaxially with simple uniseriate trichomes ca. 0.5 mm, glabrous adaxially except for the densely papillose margins, the tips of the lobes densely papillose and somewhat cucullate; filaments with the free portion 0.8–1 mm, the tube 1–2 mm, glabrous, with small teeth arising between the free portions of the filaments; anthers 4–5 × 1–1.5 mm, oblong, slightly sagittate at base, the pores teardrop-shaped, opening into longitudinal slits with age; glabrous; ovary glabrous; style 6–7 × ca. 0.05 mm, cylindrical, straight, glabrous, the stigma capitate. Fruit a globose berry 1–1.2 cm diam., green, glabrous fruiting pedicels 1.5–2.2 cm, 0.5–1 mm diam. at the base, pendent, woody, the fruiting calyx not accrescent, the lobes ca. 1 × 1 mm, brittle and somewhat patent; seeds 3–3.5 × 2–2.5 mm, flattened-reniform, pale yellow in dry material, the surfaces minutely pitted, the margins incrassate and darker yellow.

Distribution. In the understory of montane forest in northern Bolivia, on eastern Andean slopes from 1900–2200 m. Plants of *Solanum chalmersii* grow both in the forest understory and in disturbed areas along roads and streams, attaining higher population densities in open areas.

Discussion. *Solanum chalmersii* was mentioned as a probable new species in Knapp (2002a), but at that time, material was not sufficient to distinguish it from other similar species in the large *S. nudum* species group, and good fruiting material was not available in order to place it confidently. *Solanum chalmersii* possesses the flattened-reniform, pale-colored seeds, simple uniseriate trichomes, and more or less closely spaced pedicel scars typical of the *S. nudum* species group. It is most similar to *S. acuminatum* Ruiz & Pav. of central Peru to Bolivia, with which it is nearly sympatric, but differs in its uniform covering of simple uniseriate trichomes (usually confined to the vein axils in *S. acuminatum*), its flowers with longer anthers with sagittate bases, and in its longer fruiting pedicels. In Bolivia, where the two species are sympatric, *S. acuminatum* occurs at higher elevations than *S. chalmersii*.

Solanum chalmersii, despite its small overall range, is common where it occurs and forms quite dense thickets at the margins of roads and streams. It can be assessed (IUCN, 2001) as Vulnerable (VU) due to this restricted range (< 5000 km^2) and occurrence in only a few locations, but it is of less concern due to its probably weedy nature.

Additional specimens examined. BOLIVIA. **La Paz:** Prov. Sud Yungas: de Chulumani hacia el N unos 5 km hacia Irupana, entrando hacia Apa Apa, *Beck 24480* (NY); Sirupaya vic. de Yanacachi, *Buchtien 315* (NY); along rd. through primary cloud forest, 7.0–9.4 km NE of (above) Huancané, *Luteyn & Dorr 13722* (BM, LPB, NY); 5.2 km (by rd.) from Huancané on rd. to San Isidro, moist montane forest, *Nee et al. 51773* (BM, LPB, NY, USZ); rd. betw. Unduavi & Puente Villa, around hotel Castillo del Chaco & down to the Río Unduavi, *Nee et al. 51795* (BM, LPB, NY, USZ); Yanacachi, 3.5 km hacia Chojlla (as Chajlla), *Seidel & Richter 851* (LPB, NY); Cantón Yanacachi, Mina Chollja, camino a Kacapi, *Siñani 261* (LPB); ca. 6 km along rd. from Huancané to San Isidro, *Wood 9955* (K).

8. Solanum monanthemon S. Knapp, Brittonia 58: 332. 2006. TYPE: Bolivia. Santa Cruz. Prov. Caballero: Parque Nacional Amboró, Cerro Bravo, próxima a las juntas del Río Alizar y Amparo (20 km al NW de San Juan de Potrero), 17°57′S, 64°54′W, 2000 m, 10–14 Apr. 1994, *I. Vargas C., D. Ayala & J. Quiroga 3138* (holotype, LPB!; isotypes, BM!, NY!, USZ!).

Shrubs to 1.5 m tall; young stems glabrous and somewhat shiny; older stems glabrous; bark of older stems shiny reddish brown; sympodial units difoliate and geminate, the minor leaf often deciduous and nodes thus appearing unifoliate. Leaves ovate to elliptic or narrowly elliptic, chartaceous, glabrous and shiny adaxially, glabrous abaxially but with tufts of white simple uniseriate trichomes in the axils of the veins, the trichomes ca. 0.5 mm, very thin and interlaced, arising from the lamina; major leaves 7–11 × 2–4 cm, the base acute to slightly attenuate onto the petiole, the margins entire, the apex acute to long-acuminate and rounded at the very tip; minor leaves 2–5 × 1–2.7 cm, differing from the major leaves only in size; primary veins 5 to 6 pairs, only the midrib raised adaxially, the veins reddish brown abaxially; petioles 0.5–1 cm in major leaves, 0.5–0.7 cm in minor leaves, glabrous. Inflorescences consisting of a single flower (occasionally the scar of a second flower apparently present), opposite the leaves or occasionally somewhat internodal, glabrous, the peduncle and rachis absent or the pedicel appearing jointed 0.6–0.9 cm from the base; pedicels 3–3.5 cm (to 4 cm if measured to the base of the inflorescence), deflexed, tapering from the base of the calyx tube to a slender base ca. 0.2 mm diam., articulated at the base; buds when very young appearing globose, the corolla included within the elongate calyx lobes, the buds remaining globose until anthesis. Flowers apparently all perfect; calyx tube 1–1.5 mm, the lobes 3–5 × ca. 0.5 mm, long-triangular, glabrous; corolla 0.8–1 cm diam., stellate, lobed ca. 2/3 of the way to the base, white, the lobes ca. 0.5 × 0.3 mm at base, ovate-lanceolate, probably reflexed at anthesis, glabrous abaxially and adaxially except for the minutely papillose tips; filaments with the free portion ca. 0.5 mm, the tube ca. 0.5 mm, glabrous; anthers 2.5–3 × ca. 1 mm, oblong, slightly sagittate at base, connivent, yellow, the pores teardrop-shaped, opening into longitudinal slits with age; ovary glabrous; style 3–4 × ca. 0.1 mm, cylindrical, straight, glabrous, the stigma capitate. Fruit a globose berry, 1–1.2 cm diam. (immature), green, glabrous; fruiting pedicel 4.5–5 cm, 0.5–1 mm diam. at the base, ca. 3 mm diam. at the apex, pendent, slender, the fruiting calyx slightly accrescent, the lobes 5–6 × ca. 0.5 mm; seeds not known from mature fruit.

Distribution. Only known from two specimens collected in cloud forests in Parque Nacional Amboro and Parque Nacional Carrasco on the eastern slopes of the Andes in Bolivia at ca. 2000 m. The cloud forests where *Solanum monanthemon* grows have Podocarpaceae and Myrtaceae as canopy trees (fide label on *Vargas et al. 3138*).

Discussion. Specimens of *Solanum monanthemon* have occasionally been identified as the more common Bolivian species *S. trichoneuron* Lillo. It is superficially similar to that species, but differs in its dark bark and single-flowered inflorescences, which look like a single flower on an articulate pedicel arising opposite the geminate leaves. The apparent articulation is actually the joint between the inflorescence axis and the pedicel, as evidenced by some inflorescences with minute second buds that apparently abort early in inflorescence development. Many more collections of *S. monanthemon* are needed to investigate this phenomenon fully. Mature fruits of *S. monanthemon* are not known, so species group placement is tentative at present. Overall morphology (tufts of hairs in the vein axils, short anthers) suggests *S. monanthemon* belongs to the *S. nudum* species group, as accepted here, but this can be misleading (e.g., *S. smithii* S. Knapp of the *S. arenarium* Sendtn. species group also possesses these hair tufts; see Knapp, 2002a).

Solanum monanthemon can be distinguished from other species with tufts of hairs in the abaxial vein axils by its single-flowered inflorescences and its tree-like habit. It also apparently grows as isolated individuals in dense cloud forests, unlike many of the other members of the *S. nudum* species group that are plants of open areas along streams and roads both in Bolivia and throughout the Neotropics.

Solanum monanthemon is known only from two collections and, thus, cannot be assessed with confidence using the IUCN criteria (IUCN, 2001), but is likely to be of conservation concern. A conservative preliminary conservation assessment would be Endangered (EN) based on the few collections (small area of occupancy) some hundreds of kilometers apart (indicating a larger extent of occurrence of < 5000 km^2), but further searches for this apparently rare species are a priority. Its occurrence in the Parques Nacionales Amboro and Carrasco may afford it some protection.

Additional specimens examined. BOLIVIA. **Cochabamba:** Prov. Carrasco, Sehuencas, Río Fuerte cerca puente [El Puente?], Parque Nacional Carrasco, *Ibisch & Ibisch 93.1477* (LPB).

9. Solanum pabstii L. B. Sm. & Downs, Phytologia 10: 427. 1964. TYPE: Brazil. Santa Catarina: Lajes–São Joaquim, bank of the Rio Lavatudo, 1050 m, 22 Oct. 1961, *G. Pabst 6200 & E. Pereira 6373* (holotype, US 00027014!; isotype, HBR not seen). Figure 9.

Treelets or small trees 3–5 m; stems erect, glabrous; bark dark on young stems, yellowish on older stems; new growth glabrous or occasionally minutely papillate; sympodial units plurifoliate. Leaves 3.5–10.5 × 1–2.5 cm, narrowly elliptic to lanceolate, glabrous adaxially, the vein axils with resinous dots, glabrous and with distinct pit-like domatia in the vein axils abaxially, the base acute to attenuate, the margins entire, slightly revolute, the apex acute to acuminate; primary veins 6 to 8 pairs, impressed adaxially; petioles 0.2–1 cm, glabrous. Inflorescences internodal to apparently terminal, 2–8 cm, 3 to 4 times branched, with 3 to 50 flowers, glabrous, thin and brittle in dry specimens, the peduncle 1–2 cm; pedicels 1.3–1.5 cm, ca. 0.1 mm diam. at the base, ca. 0.2 mm diam. at the apex, glabrous, ± nodding at anthesis, articulating at the base; pedicel scars irregularly spaced 1–10 mm apart, plane with the rachis; buds narrowly ellipsoid, the corolla strongly exserted from the calyx. Flowers all perfect; calyx tube 1.5–2 mm, conical, the lobes 1–1.2 mm, deltate, apiculate, the margins membranous and paler, glabrous; corolla 1.3–1.9 cm diam., white, lobed ca. 2/3 of the way to the base, the lobes 0.8–1.3 cm, broadly deltate, campanulate at anthesis, the tips densely papillate; filaments with the free portion 1–2 mm, the tube absent, glabrous; anthers 2.5–4 × 1–1.5 mm, poricidal at the tips, the pores lengthening to slits with age; ovary glabrous, conical, the style 5–6 mm, straight, glabrous, the stigma clavate to slightly 2-lobed, the surface minutely papillate. Fruit a globose berry, 0.8–0.9 cm diam., green when ripe; fruiting pedicels ca. 2 cm, not markedly enlarged at the apex; seeds not known. Chromosome number not known.

Distribution. In the Brazilian states of Santa Catarina, Paraná, and Rio Grande do Sul, in Atlantic Forest and forest margins, from 600–1300 m.

Common name. "Canema" (Smith & Downs, 1966).

Discussion. *Solanum pabstii* is a very striking species, with its large, open, many-branched inflorescences of relatively large, white flowers. The inflorescence axes of *S. pabstii* are extremely thin and filiform, and are brittle on herbarium specimens. Specimens of *S. pabstii* have been misidentified as *S. pseudoquina* A. St.-Hil., another species of the *S. nudum* species group occurring in southern Brazil. The two species share filiform inflorescence axes (although the inflorescences of *S. pabstii* are much more branched) and leaves that dry pale green on the herbarium sheet. They differ in flower morphology, with *S. pabstii* having all anthers of equal size and dehiscence of pores lengthening to slits with age, and *S. pseudoquina* having markedly unequal anthers that dehisce by tiny pores that never lengthen to slits. *Solanum pseudoquina* has tufts of uniseriate trichomes in the vein axils on the abaxial leaf surfaces, while *S. pabstii* has small resinous patches on the new growth in the vein axils that develop into cavities with resinous margins in mature leaves (see Fig. 10). The cavities are probably domatia (sensu O'Dowd & Willson, 1991) and are a distinctive feature of the species, found nowhere else in the Geminata clade, and to my knowledge nowhere else in *Solanum*. Not all mature leaves develop the cavities to their full extent, but at least some leaves on every specimen examined had them. The ecological function and development of these cavities will be an interesting study in plant-insect interaction, should they be found to house mites.

Although the seeds of *S. pabstii* are not known at present, I suspect that they might be flattened-reniform with enlarged margins. *Solanum pabstii* conforms to other characters of the *S. nudum* species group, but as yet has not been included in phylogenetic analyses.

Solanum pabstii is a species of disturbed habitats and of relatively wide distribution and, thus, can be assigned a preliminary conservation status of Vulnerable (VU) due to its relatively narrow global distribution (< 20,000 km^2) using the IUCN criteria (IUCN, 2001). Further work on its specific distribution within the threatened interior Atlantic Forest of Brazil may indicate that it may be of further concern.

Additional specimens examined. BRAZIL. **Paraná:** Palmas, *Hatschbach 15030* (F, NY, US); Clevelandia, *Hatschbach 22707* (F, MO, NY); Mun. Lapa, Segundo Faxinal, trevo para Monte Alegre, *Ribas & Silva 190* (BM). **Rio Grande do Sul:** Aparades da Serra, *Pabst 6281 & Pereira 6454* (US); São Salvador, *Sehnem 2203* (NY, US); São Salvador, Montenegro, *Sehnem 3934* (F, NY, US); Estrada B. Ouro-Riozinho, *Sobral et al. ICN 111138* (NY); Mun. São Francisco do Paula–RS 235, *Wasum 270* (G). **Santa Catarina:** Mun. Lajes, Painel, Lajes, *Klein 4567* (NY, US); Mun. Urubici, cachoeira do Avencal, 29 Mar. 2001, *Hatschbach et al. 72547* (NY); Mun. Urubici, Vacas Gordas, *Mentz & Sobral 188* (NY); BR-2, planalto Santarinense, perto Sta. Cecilia, *Pabst 6123 & Pereira* (K, US); Mun. Agua Doce,

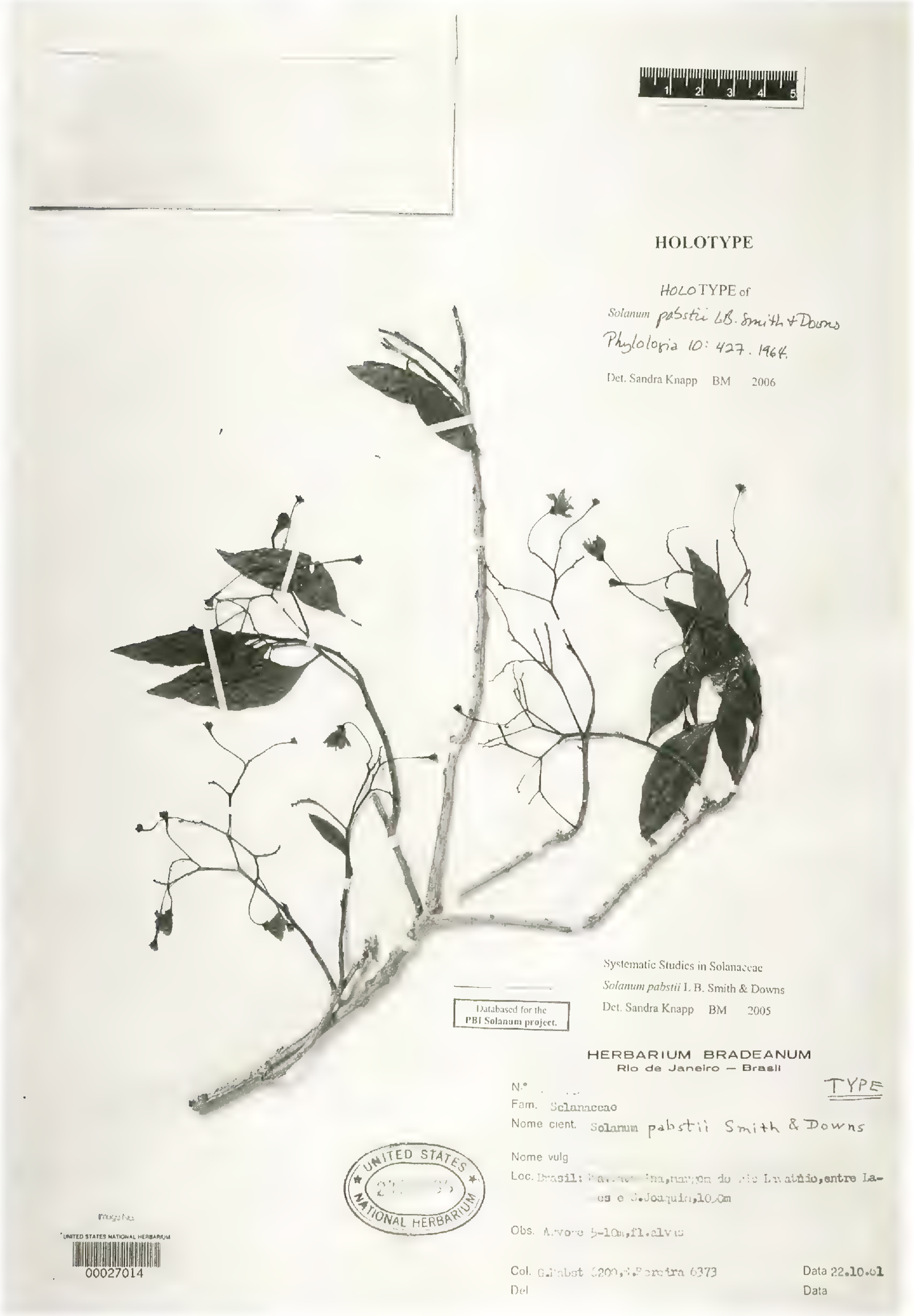

HOLOTYPE
HOLOTYPE of
Solanum pabstii L.B. Smith & Downs
Phytologia 10: 427. 1964.
Det. Sandra Knapp BM 2006
Systematic Studies in Solanaceae
Solanum pabstii L. B. Smith & Downs
Det. Sandra Knapp BM 2005
Databased for the PBI Solanum project.
HERBARIUM BRADEANUM
Rio de Janeiro — Brasil
TYPE
N.°
Fam. Solanaceae
Nome cient. Solanum pabstii Smith & Downs
Nome vulg
Loc. Brasil: [illegible] margem do rio [illegible], entre Lages e S.Joaquim, 10.0m
Obs. Arvore 5-10m, fl. alvas
Col. G.Pabst 6200, [illegible] Pereira 6373
Data 22.10.61
Del
Data
UNITED STATES NATIONAL HERBARIUM
UNITED STATES NATIONAL HERBARIUM
00027014

Figure 9. Holotype of *Solanum pabstii* (*Pabst 6200 & Pereira 6373* [US]).

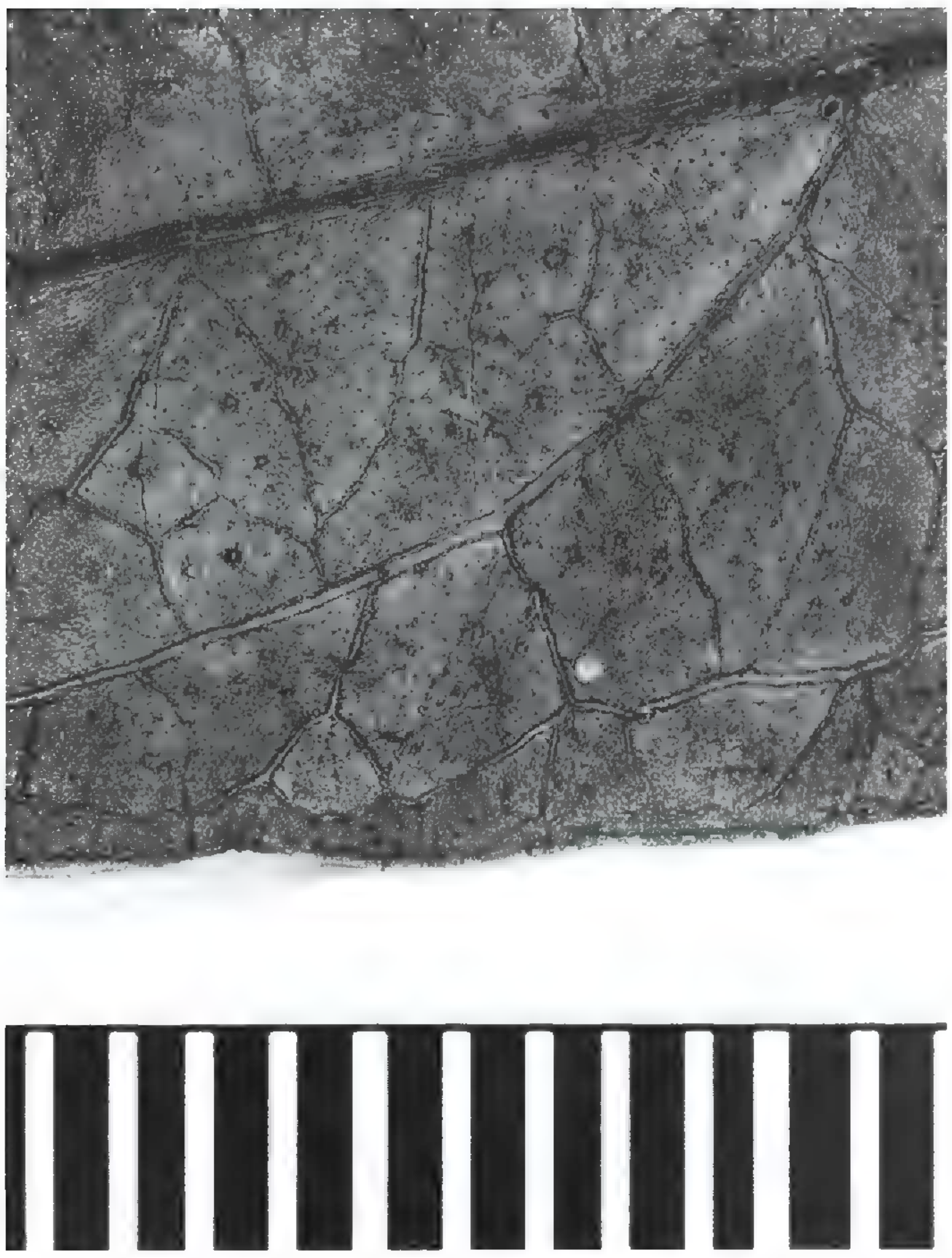


Figure 10. Detail of domatia from leaf undersurface of *Solanum pabstii* (from *Hatschbach 22707*, MO). Scale bar in millimeters.

Campos de Palmas, 24 km SE of Horizonte (Paraná), *Smith & Klein 13489* (MO, NY, US); Bom Jardim da Serra, estrada B. Jardim–S. Joaquim, Km 29, *Stehmann & Dutilh 1549* (NY).

Addition to the *Solanum leucocarpon* Species Group

Shrubs or small trees; young stems and leaves glabrous or pubescent with simple, uniseriate trichomes; sympodial units difoliate and geminate or plurifoliate, often anisophyllous. Leaves simple, elliptic to occasionally ovate, glabrous or variously pubescent with simple, uniseriate trichomes, these occasionally dendritic in some populations. Inflorescences opposite the leaves or somewhat internodal, simple or branched, glabrous or pubescent like the stems and leaves. Flowers white, fleshy, and relatively large, the corolla lobes planar at anthesis. Fruit green or yellowish green at maturity; fruiting pedicels erect or slightly deflexed, usually enlarged just below the berry, woody; seeds flattened-reniform, the margins incrassate, paler, reddish brown to yellowish tan.

Distribution. Species in the group are distributed in secondary habitats in South America, from Panama to Brazil.

10. Solanum evonymoides Sendtn. in Mart., Flora 24, Beibl. 2(5): 87. 1841. TYPE: Brazil. Bahia: "Ilheos," Nov. 1839, *C. Martius 625* (lectotype, designated here, NY!; isotypes BM!, G!, G-DC!, K!, MO!, P! [Morton neg. 8189]). Figure 11.

Shrubs or small trees 1–5 m; stems erect, stout and hollow (shattering in dry specimens), glabrous and shiny, usually dark reddish; bark dark reddish brown; new growth glabrous or sparsely red-papillate; sympodial units difoliate, not geminate. Leaves (7–) 10–25 × (1.5–)3.2–6 cm, elliptic, glabrous and shiny adaxially, glabrous or with sparse simple uniseriate trichomes 0.5–1 mm in the vein axils and along the midrib abaxially at the junctions of veins and lamina, the base attenuate, the margins entire, the apex acuminate; primary veins 9 to 13 pairs, drying yellowish; petioles 1.5–6 cm, glabrous. Inflorescences leaf-opposed or apparently (but structurally not in axils) in branch forks, (1.5–)3–4 cm, 3 to 4 times branched, with 10 to 40 flowers, glabrous, the peduncle absent and the inflorescence branching at the very base, or 0.1 to rarely 1 cm; pedicels 1.5–2.2 cm, ca. 1 mm diam. at the base, ca. 2 mm diam. at the apex, slender, nodding to ± erect at anthesis, completely glabrous, shiny, articulating at the base; pedicel scars irregularly spaced 2–6 mm apart, plane with the rachis; buds fusiform with the tip strongly pointed, strongly exserted from the calyx. Flowers apparently all perfect; calyx tube 1–1.5 mm, broadly conical, the lobes 1.5–2 mm, deltate, glabrous but with a dense tuft of uniseriate trichomes on the swollen lobe tip; corolla 2.1–2.6 cm diam., white, sweet-scented (fide *Kallunki et al. 706A*), lobed ca. 3/4 of the way to the base, the lobes 1.6–2.2 cm, planar at anthesis, densely papillate on the margins on both surfaces, hooked and cucullate at the apex; filaments with the free portion 0.5–1 mm, the tube ca. 0.25 mm, glabrous; anthers 3.5–5 × 1.5–2 mm, poricidal at the tips, the pores lengthening to slits with age; ovary glabrous, conical, the style 6–9 mm, straight, glabrous, the stigma clavate or occasionally (São Paulo populations) 2-lobed, the surfaces minutely papillate. Fruit a globose berry, 2–3 cm diam., green at maturity, the pulp sticky; fruiting pedicels 2.5–3 cm, ca. 1.5 mm diam. at the base, 3–4 mm diam. at the apex, woody and pendent; seeds 4–5 × 3.5–4 mm, flattened-reniform to ± ovoid, the margins not markedly thickened, pale yellow or white, the surfaces minutely pitted, sometimes appearing hairy. Chromosome number not known.

Distribution. Coastal Atlantic Forest of southeastern Brazil, in the states of Bahia, Espírito Santo, Rio de Janeiro, and São Paulo, from 0–550(–1800) m.

Common names. Brazil. Bahia: "caiçara" (*Lima & Messias Santos 144*), "pimientera brava" (*Santos 73*).

Discussion. *Solanum evonymoides* is a distinctive species, with its shiny, glabrous leaves and its open, highly branched inflorescences with large, white flowers. Label data indicate that the flowers are sweetly scented (*Kalllunki et al. 706A*). The cucullate, strongly hooked petal lobe apices are distinctive in *S. evonymoides*. Overall morphology suggests it is best placed in the *S. leucocarpon* Dunal species group, with other species possessing large flowers, rather large open inflorescences, and flattened seeds. Within that group it is most similar to *S. alatirameum* Bitter, also of southeastern Brazil, but can be distinguished from that species by its petiolate (rather than sessile) leaves and larger berries.

Confusion over the identity of *Solanum evonymoides* has existed for some time, with specimens being annotated as a variety of taxa. Specimens of *S. evonymoides* have been annotated as *S. glomuliflorum* Sendtn., a species of uncertain identity (most probably a species of *Aureliana* Sendtn. or *Athenaea* Sendtn., see Knapp, 2002a). The later name *S. evonymoides* J. Rémy in Gay (1846), a species of coastal southern Chile, is a synonym of *S. valdiviense* Dunal (Knapp, in prep.), a member of *Solanum* sect. *Holophylla* s. str. (see Knapp, 1989) and the Dulcamaroid clade sensu Bohs (2005). *Solanum cordioides* S. Knapp has been annotated as *S. evonymoides* in several herbaria (see Knapp, 2002a), but the two species differ in flower morphology (a smaller corolla 0.6–0.8 cm diam. and green in *S. cordioides* vs. 2.1–2.6 cm diam. and white with cucullate, hooked apices in *S. evonymoides*) and fruit size (1–1.2 cm diam. in *S. cordioides* vs. 2–3 cm diam. in *S. evonymoides*). *Solanum evonymoides* has also been confused with *S. sycocarpum* Mart. & Sendtn. (ex *Cyphomandra* Sendtn.), with which it is very similar morphologically. *Solanum evonymoides* differs in its uniformly reddish bark, the pedicels abscising flush with the inflorescence rachis and thus not leaving conspicuous pegs, and in its anthers without an enlarged connective (typical of members of the Cyphomandra clade, sensu Bohs, 1994, 2005; Weese & Bohs, 2007).

Populations of *S. evonymoides* that have smaller, shinier leaves and are altogether smaller in all parts (flowers included) from São Paulo and Rio de Janeiro states in Brazil are here treated as a geographical variant, but may warrant distinction at the species level (*Custodio Filho 265*; *Hoehne 3042*; *Martinelli et al. 13274, 13360*; *Martins et al. 12361*; *Pirani et al. 3028A*). Some of these plants with very coriaceous leaves and smaller flowers are from higher elevations (1000–1800 m) and are components of saxicolous vegetation (*Martinelli et al. 13274*). These plants, despite their marked habitat differences from other populations of *S. evonymoides*, share the key characteristics of the species: glabrous foliage, difoliate but not geminate sympodia, branched inflorescences with white flowers, petals with cucullate, hooked apices, and green fruits at maturity.

Solanum evonymoides is relatively widespread in the Atlantic Forest of coastal southern Brazil and appears to be relatively common where it does occur. However, the restricted nature of its habitat and the threats to this habitat make it necessary to monitor the conservation status of this species. Based on current herbarium specimen data, it can be assigned a status (IUCN, 2001) of Vulnerable (VU) (extent of occurrence < 20,000 km^2 and occurring in approximately 10 locations, some of which are fragmented), with monitoring across the whole species range and field assessment of the southern populations both being priorities.

The holotype of *Solanum evonymoides* was destroyed in Berlin, so the NY sheet is chosen as lectotype (Fig. 11) as it is annotated with the exact collecting locality (Ilheus) and date (1839). It has several open flowers and is a good match for the destroyed B sheet (F neg. 2817); isolectotypes are widely distributed.

Additional specimens examined. BRAZIL. s. loc., *Anon. 625* (GH), *Sellow s.n.* (BM), *Sellow 819* (BM). **Bahia:** Eunapolis–Itamaraju, *Almeida 16* (US); Mun. Uruçuca, dist. Serra Grande, 7.3 km na estrada Serra Grande–Itacaré, conjunto Faz. Santa Cruz, *Amorim 653* (K, NY); s. loc., *Blanchet 3096A* (G, W), *Blanchet 3096* (G [2]); Mun. Santa Cruz Cabrália, Est. Ecológica do Pau–Brasil, *Brito & Da Vinha 117* (F); Mun. Una, Riberão da Caveria, Serra Javi, ramal com entrada no Km 11 da rodovia São Jose–Una, lado S, 6 km do S de entrada, *Brito & Judzeiwicz 3986* (NY, US); Mun. Itamaraju, rod. Itamaraju–Teixeira de Freitas (BR 101), 3 km de Itamaraju, Faz. Chapadão, *Callejas et al. 1618* (NY); Mun. Ilhéus, Km 18 Rod. Ilhéus–Itacaré, Bom Retiro, *Carvalho et al. 6672* (BM); Mun. Itacaré, loteamento de Marambaia, ca. 6 km SW de Itacaré na estrada para BR-101, *Carvalho et al. 4121* (K, NY); Mun. Una, Fazenda Piedade, rod. São Jose–Una, a 9 km do BR-101, *dos Santos & Alves 221* (NY); Ubaitaba, Ibirapitanga, *Dos Santos 1051* (US); Mun. Santa Cruz Cabrália, Est. Ecol. Pau–Brasil, CEPLAC, *Euponino & Da Vinha 481* (NY); Mun. Santa Cruz Cabrália, Faz. Guiberti, *Lima 144* (NY); Mun. Belmonte, Estacão Exp. Gregorio Bondar, Km 58 da rodavia Belmonte–Itapebi, *Mattos Silva et al. 376* (F); Mun. Una, Km 27 da Rod. São Jose–Una, proximo a faz. Piedade, *Mattos Silva et al. 1298* (F); Mun. Una, povoado de Comandatuba, 17 km ao S de Una, *Mattos Silva et al. 1378* (F, MO); Mun. Itamaraju, ca. 5 km a W de Itamaraju, *Mori et al. 10737* (NY, US); Mun. Sta. Cruz de Cabralia, alrededores da Est. Ecol. Pau–Brasil, *Mori et al. 10813* (K, NY); Mun. Maraú, Faz. Agua Boa, BR 030 a 22 km a E de Ubaitaba, *Mori 12747* (NY); Rod. Lagoa Encantada, *Pinheiro 1490* (US); Mun. Santa Cruz Cabrália, area da Est. Ecol. Pau Brasil (ESPAB), ca. 16 km a W de Porto Seguro, Rod. BR 367 (Porto Seguro–Eunapólis), *Santos 73* (NY); Ilheos, *Sellow 244* (B); Mun. Belmonte, Barrolândia, Est. Exp. Gregorio Bondar, CEPLAC, 48 km E of BR 101 on rd. to Belmonte, *Thomas et al. 9926* (NY); Mun. Una, N edge of Una Biol. Res. ca. 500 m N of Rio Maruim, *Thomas et al.*

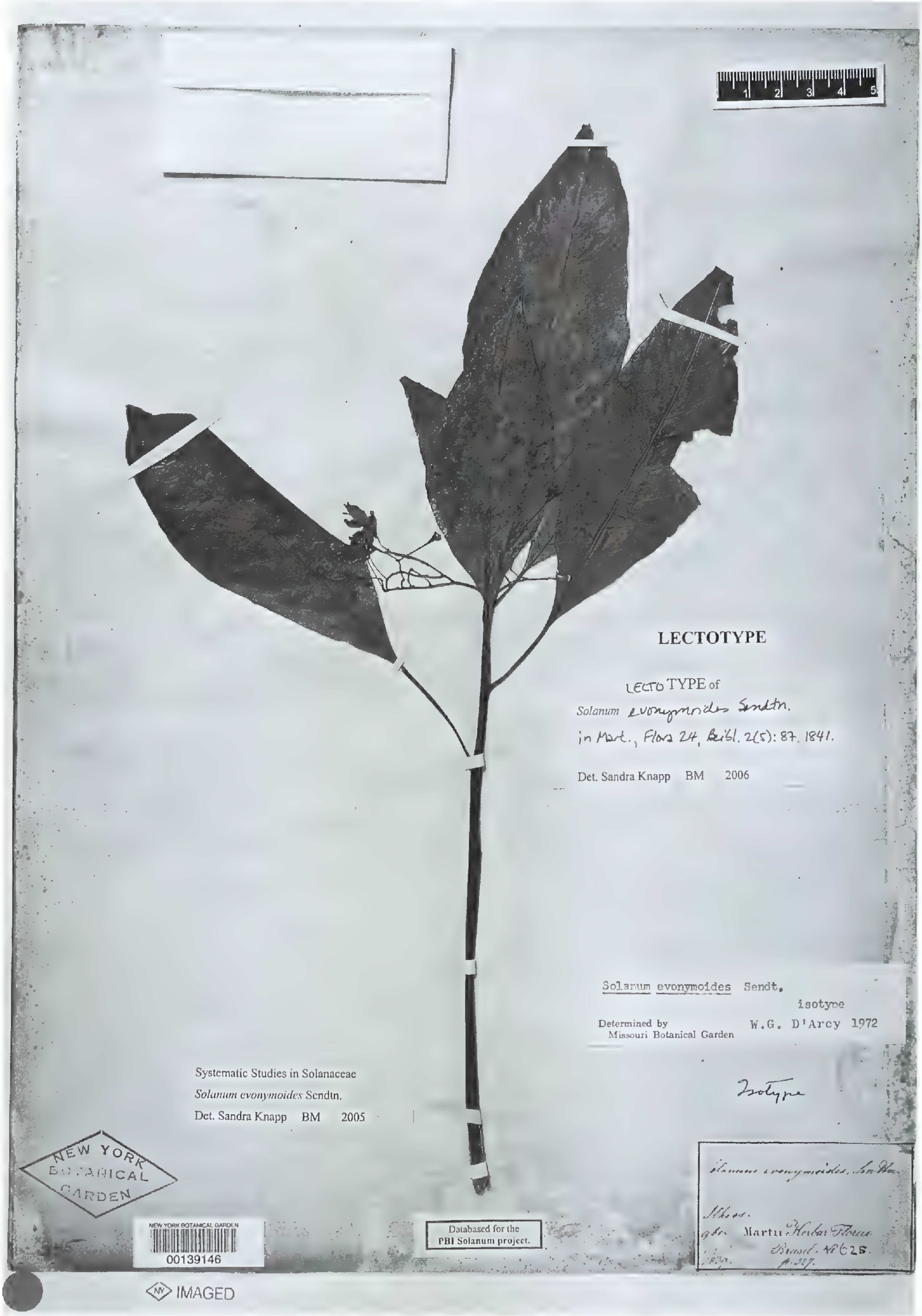

LECTOTYPE
LECTO TYPE of
Solanum evonymoides Sendtn.
in Mart., Flora 24, Beibl. 2(5): 87. 1841.
Det. Sandra Knapp BM 2006
Solanum evonymoides Sendt.
isotype
Determined by Missouri Botanical Garden W.G. D'Arcy 1972
Isotype
Systematic Studies in Solanaceae
Solanum evonymoides Sendtn.
Det. Sandra Knapp BM 2005
NEW YORK BOTANICAL GARDEN
NEW YORK BOTANICAL GARDEN
00139146
Databased for the PBI Solanum project.
Martii Herbar Florae Brasil. No 625.
IMAGED

Figure 11. Lectotype of *Solanum evonymoides* (*Martius 625* [NY]).

11202 (BM). **Espírito Santo:** Mun. Linhares, Res. Flor. Porto Seguro, CVRB/BA, *Folli 1040* (NY); Mun. Rio Bananal, Faz. Santa Angelica, gated dirt rd. to rt. at 9 km from church in Bananal on paved rd. from Bananal to Novo Brasil, *Kallunki et al. 706A* (BM); Estrada X-1, Res. Linhares, Docemade, *Sucre 8298* (F); Mun. Conceição da Barra, Res. Biol. Córrego Grande (IBAMA), a 31 km de Pedro Canário (na Avenida Aracruz) e 6 km da Base do IBAMA, *Pirani et al. 3028-A* (BM, NY). **Minas Gerais:** s. loc., 1839, *Claussen s.n.* (F); Caxoeira do Campo, *Claussen 200* (G). **Rio de Janeiro:** Serra dos Orgãos, près Theresopolis, *Glaziou 8856* (G); Mun. Santa Maria de Magdalena, Par. Est. Desengano, *Martinelli 13274* (F), Pedra do Desengano, *Martinelli 13360* (F). **São Paulo:** Cunha, Res. Flor., *Custodio Filho 265* (NY); Alto da Serra, 28 Jan. 1919, *Hoehne 3042* (US); Cunha-Res., Est. de Cunha, *Martins et al. 12361* (NY).

ADDITION TO THE *SOLANUM AMBLOPHYLLUM* SPECIES GROUP

Shrubs or small trees of high elevations, often growing in windswept edges of páramos; young stems and leaves glabrous to densely pubescent, the trichomes simple and uniseriate; sympodial units plurifoliate, or variously difoliate, geminate or not, if geminate, the minor leaves usually similar in size and shape to the major leaves. Leaves simple, elliptic to obovate, often thick and coriaceous. Inflorescences opposite the leaves, or occasionally lateral or appearing terminal, simple or several times branched. Flowers white, fleshy and rather large, the petals planar or campanulate at anthesis. Fruit green or yellowish, hard at maturity; fruiting pedicels deflexed or somewhat erect, woody and occasionally rugose; seeds flattened-reniform, pale tan to reddish brown.

Distribution. Species of the group occur at high elevations in the Andes, from Colombia to southern Peru.

11. Solanum elvasioides S. Knapp, sp. nov. TYPE: Ecuador. Loja: rd. Loja–Las Achiras (Uritusinga), Km 9 from the Universidad Nacional de Loja, 2800 m, 4°03′21″S, 79°13′60″W, 20 May 2001, *J. E. Madsen, A. Byg & C. Chimbo 8054* (holotype, LOJA!; isotypes, AAU!, MO!, QCA!, QCNE!). Figure 12.

Species *Solanum barbulato* Zahlbr. similis, sed caulibus et foliis ominino glabris, sympodiis unifoliatis interdum difoliatis subgeminatis, venis numerosis subparallelis differt.

Shrubs to small trees 2–5 m; stems slender, seemingly brittle, glabrous and grayish; bark pale gray on older stems; new growth glabrous or sparsely papillate, the papillae white or reddish; sympodial units usually unifoliate on reproductive shoots, occasionally difoliate and almost geminate. Leaves 3.5–9 × 0.9–2.5 cm, narrowly elliptic to lanceolate, glabrous on both surfaces, the base attenuate, the margins revolute in dry material, the apex acuminate or acute; primary veins 15 to 30 pairs, very closely spaced and subparallel, barely visible adaxially, not at all prominent abaxially, the midrib drying yellowish; petioles 0.2–0.9 cm, slightly winged from the decurrent leaf bases. Inflorescences leaf-opposed or occasionally internodal, 0.1–1 cm, simple, with 2 to 6 flowers, glabrous, the peduncle 0–0.2 cm; pedicels in flower not known, in bud glabrous; pedicel scars closely spaced and overlapping, plane with the rachis; buds (very young) elliptic. Flowers not known. Fruit a globose berry, 0.9–1 cm diam., green at maturity, glabrous; fruiting pedicels 1–1.5 cm, ca. 0.5 mm at the base, ca. 1.5 mm at the apex, deflexed to somewhat deflexed. Seeds 0.3–0.4 × 0.2–0.3 mm, flattened-reniform, reddish brown, the margins slightly paler and thickened, the surfaces minutely pitted. Chromosome number unknown.

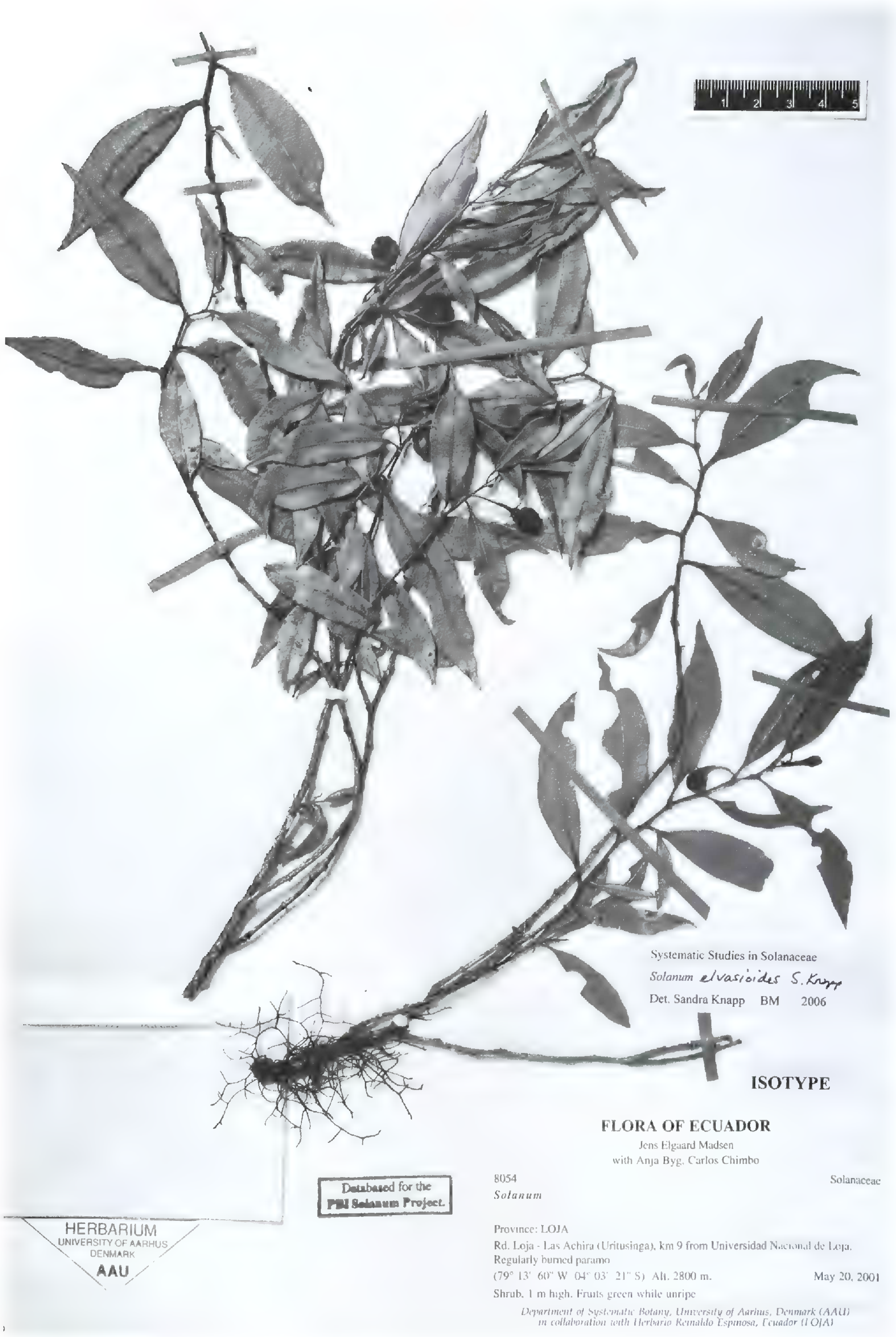
Distribution. In páramo and shrubby vegetation from 2600–2800 m in the province of Loja, Ecuador.

Etymology. *Solanum elvasioides* is named for its leaves with tightly parallel venation that slightly resemble those of *Elvasia* DC. (Ochnaceae).

Discussion. Although *Solanum elvasioides* is only known from fruiting material, I am describing it here in order that flowering material might be sought. It must be a very rare species, as the numerous collections made in the vicinity of Loja in the last decades by collectors from the University of Aarhus and the Missouri Botanical Garden have only revealed two specimens (cited here). These collections are about 10 km apart on the western slope of the north-south ridge west of Loja (the continental divide), where the terrain drops steeply to the deep, dry Catamayo valley (D. Neill, pers. comm.).

Solanum elvasioides is superficially similar to both *S. barbulatum* Zahlbr. (of the *S. amblophyllum* Hook. species group) and *S. smithii* (of the *S. arenarium* species group), both of which occur in the same general region of southern Ecuador, but the tightly spaced, parallel leaf venation and total glabrousness of *S. elvasioides* are distinctive. It is likely to belong to the *S. amblophyllum* species group (sensu Knapp, 2002a), with other taxa from high elevations with flattened-reniform seeds. The *S. amblophyllum* species group is one of the few species groups from Knapp (2002a) that may be monophyletic (J. C. Granados-Tochoy, pers. comm.).

A preliminary conservation assessment of *Solanum elvasioides* would be Endangered (EN), based on its very small range (two currently known populations 10 km apart, so extent of occurrence $<$ 100 km^2; see



Systematic Studies in Solanaceae
Solanum elvasioides S. Knapp
Det. Sandra Knapp BM 2006

ISOTYPE

FLORA OF ECUADOR
Jens Elgaard Madsen
with Anja Byg, Carlos Chimbo

8054 Solanaceae
Solanum

Province: LOJA
Rd. Loja - Las Achira (Uritusinga), km 9 from Universidad Nacional de Loja.
Regularly burned paramo
(79° 13' 60" W 04° 03' 21" S) Alt. 2800 m. May 20, 2001
Shrub, 1 m high. Fruits green while unripe

Department of Systematic Botany, University of Aarhus, Denmark (AAU)
in collaboration with Herbario Reinaldo Espinosa, Ecuador (LOJA)

Databased for the
PBI Solanum Project.

HERBARIUM
UNIVERSITY OF AARHUS
DENMARK
AAU

Figure 12. Isotype of *Solanum elvasioides* (*Madsen et al. 8054* [AAU]).

IUCN, 2001) and the threat from fire spreading into its montane forest habitat from the drier forests in the heavily populated Catamayo valley (see Kessler [1992] for a discussion of threats to the forests of southwestern Ecuador).

Paratype. ECUADOR. **Loja:** Cerro Villanaco, old rd. Loja–Pedestal–La Toma, Km 10, 2670 m, 4°00′13″S, 79°15′14″W, 10 Apr. 1994, *P. M. Jørgensen, C. Ulloa & H. Vargas 44* (LOJA, MO, QCA not seen).

ADDITIONS TO THE *SOLANUM ARBOREUM* SPECIES GROUP

Shrubs or small trees; young stems and leaves glabrous to densely red-papillose, occasionally pubescent with simple, uniseriate trichomes; sympodial units difoliate and geminate, often strongly anisophyllous, occasionally unifoliate or plurifoliate. Leaves simple, narrowly elliptic to obovate, usually glabrous on both surfaces. Inflorescences opposite the leaves or occasionally internodal, simple, few to many-flowered. Flowers white, small, and with the lobes deflexed at anthesis or larger and fleshy with the lobes planar at anthesis. Fruit usually green and hard at maturity; fruiting pedicels usually erect and thickening at maturity, occasionally deflexed; seeds ovoid-reniform, pale tan to dark brown, often rather large.

Distribution. Species of the group occur in primary forests from Central America to Bolivia, at a wide range of elevations.

12. Solanum humboldtianum Granados-Tochoy & S. Knapp, Syst. Bot. 32: 202. 2007. TYPE: Colombia. Cundinamarca: Mun. Bojacá, vereda San Antonio, finca El Triunfo, saliendo hacia la carretera que conduce de Mosquera a Tena, 2600–2700 m, 29 Jan. 2005, *J. C. Granados-Tochoy & W. Meier 860* (holotype, COL!; isotypes, BM!, FMB!, HUA!).

Small trees to 10 m, diffusely branched; stems scandent, 4-angled, drying pale brownish or more yellowish when young; new growth with the vegetative buds minutely pubescent with simple, glandular 2-celled trichomes, reddish in dry material, soon deciduous; bark of older stems exfoliating; sympodial units unifoliate or difoliate, not geminate. Leaves 5–25 × 3–12 cm, elliptic to obovate, chartaceous to subcoriaceous, glabrous, markedly discolorous, adaxially bright green when fresh, becoming olive green or pale tan in dry material, somewhat shiny, abaxially yellowish green when fresh, becoming golden in dry material; base acute, slightly asymmetric; margins entire, revolute; apex acute to acuminate or emarginate, somewhat asymmetric; primary veins 7 to 14 pairs, with the midrib impressed adaxially, keeled abaxially, drying reddish green; petiole 1–4 cm, channeled adaxially, corrugated transversely and somewhat corky, glabrous. Inflorescences leaf-opposed or internodal, 1–11 cm, usually simple, occasionally bifurcate, with 6 to 50 flowers, the peduncle 0.5–5 cm, ca. 3 mm diam. at the base, stout; pedicels 0.5–1 cm, ca. 1.5 mm diam. at the base, ca. 1 mm diam. at the apex, fleshy, nodding at anthesis, glabrous, articulated at the base; pedicel scars closely spaced in 2 distinct rows, the rows and individual scars overlapping; buds globose, becoming ellipsoid, sparsely pubescent with simple trichomes to 0.5 mm, about halfway exserted from the calyx tube. Flowers heterostylous; calyx tube 2–3 mm, campanulate, the lobes 1–1.5 mm, broadly deltate to truncate, pubescent with tufts of simple, uniseriate trichomes ca. 0.5 mm at the apices, sometimes bifid and irregular; corolla 1–2 cm diam., white, fleshy, lobed ca. 2/3 of the way to the base, the lobes 0.7–1.1 cm, adaxially glabrous, abaxially densely pubescent with minute uniseriate glandular trichomes, these reddish when dry, the petal midvein keeled adaxially, the lobes cucullate at the tips; filaments with the free portion ca. 0.1 mm, the tube less than 0.2 mm, sometimes with tiny apiculae ca. 0.5 mm on the margin between the filaments, glabrous; anthers 3–4 × 1.1–5 mm, poricidal at the tips, the pores lengthening to teardrop-shaped slits with age; ovary 1–2 mm, subpyramidal, glabrous, the apex somewhat tuberculate; style straight, glabrous, short styles 2–3 mm, long styles 4–5 mm, the stigma capitate, slightly 2-lobed, the surface minutely papillate. Fruit a globose to subglobose berry, 1.5–2 × 1.2–1.6 cm, green and hard at maturity, the pericarp coriaceous; fruiting pedicels 1.5–3 cm, distally enlarged, woody and deflexed, the calyx lobes in fruit expanding to twice their size in flower, tightly investing the base of the berry; seeds ca. 30 per fruit, 3–4 × 2–3 mm, flattened-reniform, creamy yellow in fresh material, yellowish tan when dry, the margins incrassate, the surfaces minutely pitted. Chromosome number not known.

Distribution. Endemic to the western Andean slopes of Colombia in the departments of Cundinamarca and Santander, in premontane cloud forests from 2400–2700 m.

Discussion. *Solanum humboldtianum* is very similar morphologically to *S. goniocaulon* S. Knapp (of the *S. arboreum* species group) from southern Ecuador and adjacent northern Peru and to *S. laurifrons* Bitter (of the *S. amblophyllum* species group) from the Cordillera Occidental of Colombia (see Knapp, 2002a). The three species share papillate new growth, angular fleshy stems, markedly discolorous leaves that dry yellowish abaxially, and cucullate petal apices. *Solanum humboldtianum* is also a scandent or somewhat lianescent shrub, a habit not recorded in other similar species. *Solanum goniocaulon* is a member of the *S. arboreum* species group (sensu Knapp, 2002a), all with ovoid seeds. Within the *S. arboreum* species group, it may be that *S. humboldtianum* is closely related, as well as morphologically similar, to *S. goniocaulon*.

Solanum humboldtianum has been assessed as Endangered (EN) using IUCN Red List criteria (IUCN, 2001), based on its extent of occurrence of less than 5000 km^2, area of occupancy less than 100 km^2, its severely fragmented (four current locations) and small overall population size, and the unprotected nature of most of the populations near a major population center (Granados-Tochoy et al., 2007). *Solanum humboldtianum* is being propagated in the Jardín Botánico de Bogotá José Celestino Mutis, with plants crossing easily and producing ample seed (J. C. Granados-Tochoy, unpubl.), making ex situ conservation a possibility.

Additional specimens examined. COLOMBIA. **Cundinamarca:** Mun. Bojacá, vereda San Antonio, *Granados-Tochoy et al. 389* (COL), *Granados-Tochoy & Giraldo-Cañas 844* (COL); near Sibaté, San Miguel, *Hawkes & García-Barriga 36* (K); Santa Fé de Bogotá, 1805, *Humboldt & Bonpland s.n.* (P); Mun. Granada, hac. "El Soche," *Idrobo 5437* (COL, FMB); Mun. Bojacá, vereda San Antonio, "La Merced," próximo a la carretera Mosquera–Tena, *Lozano-C. & Torres-R. 98* (COL); Mun. Cabrera, vereda Núñez, *Morales et al. 497* (COL). **Santander:** Mun. El Encino, vereda Santa Helena, predio La Sierra, margen izquierdo aguas abajo del Río La Rusia, Santuario de Flora y Fauna Guanetá, Alto Río Fonce, *Cadena et al. 78* (COL, UIS).

13. Solanum sagittantherum Granados-Tochoy & C. I. Orozco, Caldasia 28(1): 2. 2006. TYPE: Colombia. Cundinamarca: Mun. Sibaté, sector El Soche, vía Bogotá–Silvania, ca. 2900 m, 31 May 2005, *J. C. Granados-Tochoy, D. Giraldo-Cañas & D. Canal 888* (holotype, COL!; isotypes, FMB not seen, HUA not seen).

Subshrub to 1.5 m, rhizomatous; young stems slightly angular, minutely papillose with trichomes less than 0.05 mm, sparsely pubescent with simple uniseriate trichomes to 0.5 mm, glabrescent; new growth papillose, puberulent, the trichomes to 0.5 mm, leaf margins in bud ciliate distally; sympodial units difoliate, geminate, anisophyllous. Leaves elliptic to ovate, occasionally obovate, chartaceous, larger on vegetative shoots, adaxially dark green in fresh material, drying olive green to brownish, abaxially yellowish, drying golden-green, glabrous on both surfaces, abaxially minutely puberulent on the veins, the trichomes simple, uniseriate, to 0.5 mm, the veins pale green in fresh material, drying brownish green; major leaves 3–21 × 1–8 cm, the base acute to cuneate, occasionally oblique, the margins entire to slightly sinuate, revolute when dry, the apex acute to acuminate, inconspicuously ciliate at the tip; minor leaves differing from the major leaves only in size, 0.5–3 × 0.3–2 cm; primary veins 4 to 12 pairs, impressed to slightly prominent adaxially, prominent abaxially; petioles 0.2–3 cm, glabrous, channeled adaxially, with a few transverse stripes near the base. Inflorescences opposite the leaves, 0.5–0.9 cm, simple, with 3 to 8 flowers, papillose and sparsely pubescent like the young stems, the peduncle 0.05–0.5 cm; pedicels at anthesis 0.5–1 cm, weakly to strongly reflexed, somewhat enlarged at the apex, articulated at the base; pedicel scars closely packed, somewhat separated or overlapping; buds globose when young, later ellipsoid, one calyx lobe prominently veined and larger than the rest, the corolla strongly exserted from the calyx tube. Flowers tetramerous, isostylous; calyx white or greenish white in fresh material, cream in dry material, the tube ca. 1 mm, broadly conic, glabrous or pubescent on external surface with simple uniseriate trichomes ca. 0.5 mm, on internal surface minutely glandular-papillose, the papillae less than 0.1 mm, the lobes 1–1.5 × 1.5–3 mm, broadly deltate, glabrous or sparsely pubescent with simple uniseriate trichomes and glandular papillae like the tube, the apex of one of the lobes often enlarged to a fleshy projection ca. 0.2 mm, an extension of the midvein; corolla 1.5–2 cm diam., fleshy, white, stellate, lobed 2/3 of the way to the base, the lobes 0.5–0.9 cm, elliptic, planar at anthesis, cucullate at the tips, the tips and margins minutely papillate, the papillae less than 0.1 mm; filaments with the free portion ca. 0.1 mm, the tube 1.5–2 mm, glabrous; anthers 4–5 × ca. 1 mm, sagittate at the base, poricidal at the tips, the pores lengthening to slits with age; ovary ca. 1 × 1 mm, conical, glabrous; style 6–8 mm, straight or sigmoidally curved, white in live plants, the stigma ca. 1 mm diam., capitate, the surface minutely papillate. Fruit a globose berry, 1–1.5 × 1–1.5 cm, green at maturity, drying brownish green; fruiting pedicels 1.5–2 cm, strongly deflexed beneath the foliage, distally enlarged, the calyx lobes in fruit ca. 2 times the size at anthesis, tightly appressed to berry in fresh material, reflexed in dry material; seeds ca. 2–3 mm, flattened-reniform, pale green in fresh material, reddish brown in dry material, the margins enlarged, the testa minutely pitted. Chromosome number not known.

Distribution. Only known from the type locality on the western slopes of the Cordillera Oriental of the

Colombian Andes, in pristine cloud forest from 2700–2900 m.

Discussion. *Solanum sagittantherum* is unusual in the Geminata clade in possessing tetramerous flowers, but other species originally described with tetramerous flowers have later been shown to have populations with pentamerous flowers as well (e.g., *S. cruciferum* Bitter, see Knapp, 2002a). Should more populations of *S. sagittantherum* be found, they may indeed prove to be pentamerous. Granados-Tochoy and Orozco (2006) were uncertain of the affinities of *S. sagittantherum*, as it combines many of the characteristics of several of the pragmatic species groups delimited by Knapp (2002a). Its flattened seeds and apically enlarged fruiting pedicel make it similar to members of the *S. leucocarpon* group, while the rhizomatous habit is shared with both *S. arboreum* and *S. robustifrons* Bitter (of the *S. arboreum* and *S. robustifrons* species groups, respectively). The rhizomatous habit is unusual in the Geminata clade and may be related to the humid nature of the habitat in which *S. sagittantherum* occurs. The sagittate anther bases for which the species is named are also very unusual in the Geminata clade, but are also present in *S. amblophyllum* of central Peru, which differs from *S. sagittantherum* in distribution, in having plurifoliate, rather than difoliate and geminate, sympodial units, and in its complex branched inflorescences, and in *S. chalmersii* of Bolivia, which is densely pubescent. I have tentatively placed *S. sagittantherum* in the *S. arboreum* species group based on its overall morphology, but molecular results may clarify its status.

Solanum sagittantherum is known only from the type locality (four collections were cited in Granados-Tochoy and Orozco [2006], all from El Soche, but no population details were reported; I have not seen this material) and needs further investigation before a confident conservation status can be assigned. Given the fragmented nature of the cloud forest habitat in the Colombian Department of Cundinamarca (Granados-Tochoy et al., 2006), it is likely to be of conservation concern, but it can be given a preliminary assessment (IUCN, 2001) of Critically Endangered (CR) due to its very restricted distribution (< 100 km^2) in a single locality.

ADDITION TO THE *SOLANUM NIGRICANS* SPECIES GROUP

Shrubs or small trees; young stems and leaves usually pubescent with usually arachnoid, but occasionally dendritic or simple trichomes; sympodial units unifoliate, difoliate or trifoliate, or difoliate and geminate. Leaves simple, elliptic to ovate, usually pubescent abaxially, occasionally glabrous, the trichomes like those of the young stems. Inflorescences opposite the leaves, 3- to 20-flowered. Flowers white, thick and fleshy, the corolla lobes planar at anthesis; ovary glabrous or pubescent. Fruit green and hard at maturity, glabrous or pubescent; fruiting pedicels erect or somewhat deflexed, woody; seeds ovoid-reniform, usually dark reddish brown.

Distribution. Species of the group are usually found in forests, in montane forests from Mexico to Honduras and the Andes, and in *Araucaria* and coastal forests in southeastern Brazil.

14. Solanum canoasense L. B. Sm. & Downs, Fl. Ilustr. Catarin., Pt. 1 Solanac. 104. 1966. *Solanum cataractae* L. B. Sm. & Downs, Phytologia 10: 427. 1964. TYPE: Brazil. Santa Catarina: Mun. Bom Retiro, Rio Canoas, Campo dos Padres, 1300–1400 m, 22 Nov. 1956, *L. B. Smith & R. Klein 7843* (holotype, US 00026997!; isotypes, HBR not seen, R not seen).

Small shrubs 0.5–2 m; stems slender, erect, glabrescent; bark reddish; new growth densely pubescent with uniseriate dendritic and/or arachnoid trichomes, these soon deciduous; sympodial units plurifoliate. Leaves 3–9 × 1–2.1 cm, lanceolate to oblanceolate to narrowly lanceolate or oblanceolate, widest in the upper 1/3, both surfaces glabrous, the leaves crowded at branch apices, the base attenuate, the margins revolute, the apex acute; primary veins 7 to 9 pairs, drying paler than the lamina; petioles 0.4–0.6 cm, sparsely dendritic pubescent adaxially. Inflorescences internodal, appearing terminal, 0.6–1 cm, simple, with 2 to 4 flowers, densely pubescent with uniseriate arachnoid or dendritic trichomes, the peduncle 0.2–0.5 cm; pedicels 1.3–1.6 cm, ca. 1 mm diam. at the base, ca. 1.5 mm diam. at the apex, stout, ± nodding at anthesis, sparsely branched pubescent like the inflorescence, articulated at the base; pedicel scars 1–2 mm apart; buds ellipsoid, the corolla strongly exserted from the calyx tube. Flowers all perfect (?); calyx tube (1–)2–2.5 mm, broadly conical, the lobes 2–4 mm, broadly and irregularly deltate, thick and fleshy, the margins thickened and paler when dry, sparsely pubescent with arachnoid or dendritic trichomes especially near the tips; corolla 2–2.2 cm diam., white, lobed ca. 2/3 of the way to the base, the lobes 1–2 cm, broadly deltate, ± planar at anthesis, sparsely to densely pubescent abaxially especially in the sinuses and distally with branched uniseriate or papillate trichomes, these especially dense at the tips; filaments with the free portion 1–1.5 mm, the tube ca. 1 mm, glabrous; anthers 5–6 × 1.5–2 mm, poricidal at the tips, the pores lengthening to slits with age; ovary conical, glabrous, the style 1–1.1 cm, straight, glabrous, the stigma clavate, the surface minutely papillate. Fruit not seen; seeds not seen. Chromosome number not known.

Distribution. In *Araucaria* forests, cloud forests, and forest edges in the Brazilian states of Santa Catarina and Paraná, from 1300–1400 m.

Common name. "Canema mirim" (Smith & Downs, 1966).

Discussion. *Solanum canoasense* is distinctive among southeastern Brazilian members of the Geminata clade in its large flowers and floccose, but soon glabrescent, new growth. The species is known from very few collections, and it is apparently very rare. Mentz and Oliveira (2004) put *S. canoasense* in synonymy with *S. cassioides* L. B. Sm. & Downs, from which it differs in not possessing the distinctive broad-based trichomes found in *S. cassioides* and its relative *S. trachytrichium* Bitter, and in its plurifoliate, rather than difoliate, sympodial units. *Solanum canoasense* is a member of the *S. nigricans* M. Martens & Galeotti species group (sensu Knapp, 2002a) based on the possession of floccose trichomes on the new growth, but seed morphology is not known. The type of *S. canoasense* is nearly glabrous, like *S. bahianum* S. Knapp of coastal Bahia, Brazil. *Solanum canoasense* differs from *S. bahianum* in its plurifoliate rather than unifoliate sympodia, and in its larger flowers that are somewhat campanulate at anthesis. The two species occupy very different habitats, *S. bahianum* the coastal restingas and *S. canoasense* upland *Araucaria* forests. No fruiting specimens are known, and collections of fruiting material are a priority.

Conservation assessments of *S. canoasense* are difficult, due to the few specimens available. The small area of occupancy (few collections) and restricted distribution of the species in threatened habitat (*Araucaria* forests) suggest it is of concern and could be assigned a preliminary conservation status (IUCN, 2001) of Endangered (EN).

Additional specimens examined. BRAZIL. **Paraná:** Mun. Guaratuba, Serra do Araçatuba, *Kummrow 2410* (NY). **Santa Catarina:** Mun. Urubici, estrada Serra do Corvo Branco, *Stehmann 1756* (NY).

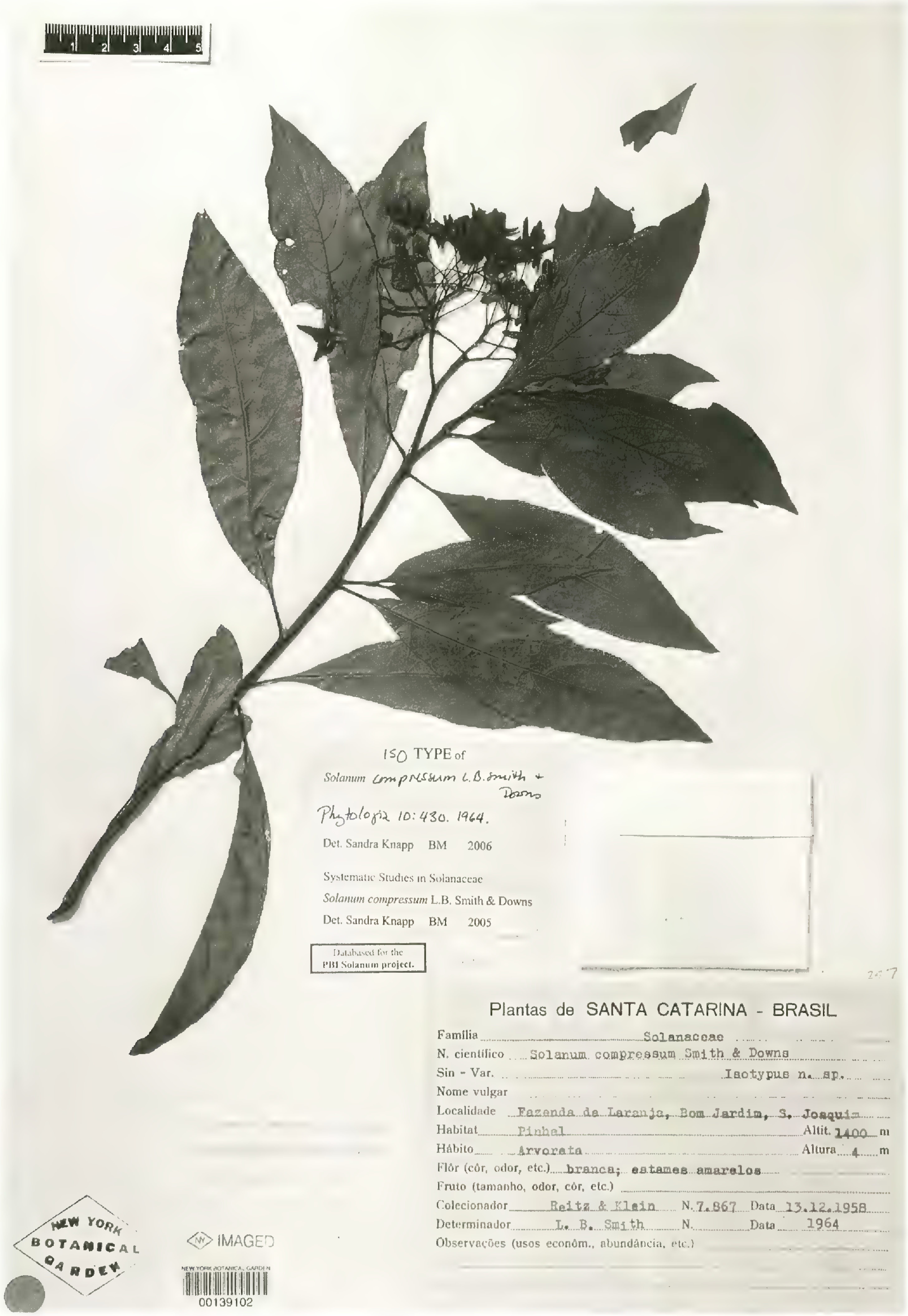
ADDITIONS TO THE *SOLANUM ARENARIUM* SPECIES GROUP

Small shrubs; young stems and leaves sparsely to densely pubescent with dendritic trichomes, these often very densely branched; sympodial units unifoliate or more commonly difoliate and geminate. Leaves simple, lanceolate to elliptic, occasionally shiny adaxially, pubescent abaxially with dendritic trichomes, these confined to the vein axils or densely covering the surface, the apex and base various. Inflorescences opposite the leaves or occasionally internodal, simple, densely pubescent like the stems and leaves, the trichomes dendritic; pedicel scars closely spaced or unevenly spaced and ca. 5 mm apart. Flowers white, usually somewhat fleshy, the corolla lobes planar at anthesis. Fruit green or greenish yellow and hard at maturity, the pericarp occasionally thin and brittle in dry specimens, glabrous or densely pubescent with dendritic trichomes; fruiting pedicels woody, deflexed; seeds very large, ovoid-reniform, pale tan or yellow.

Distribution. Species in the group are distributed in montane forests in the Andes in Ecuador, Peru, and Bolivia, and in a variety of habitats in southeastern Brazil.

15. Solanum compressum L. B. Sm. & Downs, Phytologia 10: 430. 1964. TYPE: Brazil. Santa Catarina: São Joaquim, Fazenda de Laranja, Bom Jardim, 1400 m, 13 Dec. 1958, *P. Reitz & R. Klein 7867* (holotype, US 00027001!; isotypes, HBR not seen, NY!). Figure 13.

Trees to small treelets 5–10 m, to 15 cm DBH; stems spreading, sparsely pubescent with loose, golden uniseriate dendritic trichomes 0.5–1 mm, soon glabrescent; bark dark reddish brown; new growth densely golden dendritic pubescent, the trichomes ca. 1 mm; sympodial units plurifoliate. Leaves 4–15 × 1.6–5 cm, elliptic to narrowly elliptic, glabrous and slightly shiny adaxially, occasionally with a few scattered uniseriate simple trichomes on the lamina, abaxially very variably pubescent, from a few denditic trichomes 0.5–1 mm in the vein axils to sparsely pubescent over the entire lamina with dendritic trichomes 0.5–1 mm, the trichomes with a uniseriate stalk and very short branches, always denser in the vein axils, the base acute to attenuate, the margins entire, the apex acute; primary veins 9 to 10 pairs, the midrib keeled adaxially; petioles 1–2.5 cm, glabrous or sparsely dendritic pubescent. Inflorescences terminal, much longer than the new growth, 4–9 cm, 3 to 4(to 6) times branched, with 30 to 40 flowers, glabrous or sparsely pubescent with loose dendritic trichomes like those of the stems, the peduncle 2–6 cm; pedicels 1.4–1.6 cm, ca. 0.5 mm diam. at the base, ca. 1 mm diam. at the apex, filiform, ± deflexed at anthesis, glabrous to sparsely dendritic pubescent; pedicel scars irregularly spaced 0.5–1 mm apart, plane with the rachis; buds ellipsoid, pointed at the tips, strongly exserted from the calyx tube. Flowers apparently all perfect; calyx tube 1–1.5 mm, broadly conical, the lobes 1.5–2.5 mm, deltate, densely pubescent with dendritic trichomes ca. 0.5 mm on the tips; corolla 1.5–2 cm diam., white, lobed ca. 3/4 of the way to the



ISO TYPE of
Solanum compressum L.B. Smith + Downs
Phytologia 10: 430. 1964.
Det. Sandra Knapp BM 2006

Systematic Studies in Solanaceae
Solanum compressum L.B. Smith & Downs
Det. Sandra Knapp BM 2005

Databased for the PBI Solanum project.

Plantas de SANTA CATARINA - BRASIL

Familia Solanaceae
N. científico Solanum compressum Smith & Downs
Sin - Var. Isotypus n. sp.
Nome vulgar
Localidade Fazenda da Laranja, Bom Jardim, S. Joaquim
Habitat Pinhal Altit. 1400 m
Hábito Arvoreta Altura 4 m
Flôr (côr, odor, etc.) branca; estames amarelos
Fruto (tamanho, odor, côr, etc.)
Colecionador Reitz & Klein N. 7.867 Data 13.12.1958
Determinador L. B. Smith N. Data 1964
Observações (usos econôm., abundância, etc.)

NEW YORK BOTANICAL GARDEN
IMAGED
NEW YORK BOTANICAL GARDEN
00139102

Figure 13. Isotype of *Solanum compressum* (*Reitz & Klein 7867* [NY]).

base, the lobes 1–1.5 cm, deltate, planar at anthesis, minutely dendritic pubescent on the tips and margins; filaments with the free portion ca. 0.5 mm, the tube ca. 0.5 mm or less, glabrous; anthers 3.5–4 × 1.5–2 mm, poridical at the tips, the pores lengthening to slits with age, the abaxial surface papillate and rough; ovary conical, glabrous, the style 6–7 mm, straight, glabrous, the stigma clavate, 2-lobed, the surface minutely papillate. Fruit a globose berry, 1–1.5 cm diam., pale green at maturity, the pericarp woody when dry; fruiting pedicels 2.5–3 cm, ca. 1.5 mm diam. at the base, ca. 3 mm diam. at the apex, pendent, the calyx lobes enlarging in fruit to 3–4 mm; seeds ca. 2 × 1.5 mm (immature?), ovoid-reniform, pale yellow, the surfaces minutely pitted, the margins not incrassate. Chromosome number not known.

Distribution. In Brazil (Rio Grande do Sul, Santa Catarina, and Paraná) and adjacent Argentina and Paraguay, in open forests on the planalto, interior Atlantic Forest, and *Araucaria* forests, from 750–1400 m.

Common name. "Canema mirim" (Smith & Downs, 1966).

Discussion. Solanum compressum is somewhat similar to *S. pabstii*, also of southeastern Brazil, but the dendritic pubescence, larger flowers, and more robust inflorescences easily distinguish it from that species. The trichomes and ovoid seeds of *S. compressum* place it as a member of the *S. arenarium* species group (sensu Knapp, 2002a) and are particularly like those of *S. gnaphalocarpon* Vell. from Brazil. *Solanum gnaphalocarpon* has difoliate, geminate sympodia that are anisophyllous, a simple inflorescence, and a distinctive densely long-pubescent fruit. The seed morphology of *S. compressum* needs further examination, as those I have examined are from what may be immature fruits.

Solanum compressum is very variable in pubescence density throughout its range, with some plants being nearly glabrous and others densely pubescent on all parts. The trichomes are always dendritic, with a long uniseriate stalk and very short branches. The abaxial surface of the anthers of *S. compressum* is papillate in herbarium specimens and somewhat reminiscent of the anther margins of wild tomatoes (Carrizo García, 2003; Peralta et al., 2008). Whether this is merely an artifact of drying is not known, but it occurs in all flowering specimens I have examined.

Solanum compressum is relatively widespread in the Atlantic Interior Forest of Brazil, Argentina, and Paraguay. It grows often in disturbed habitats at the edges of forests and roads. It can be assigned a preliminary conservation status of Near Threatened (NT) (IUCN, 2001), due to the fact that the habitat in which it occurs (Atlantic Interior Forest or Selva Paranaënse) is highly threatened; monitoring will be necessary.

Additional specimens examined. ARGENTINA. **Misiones:** Dpto. Gral. Manuel Belgrano, Ruta Nac. 101, 8 km de Bernardo de Irigoyen hacia San Antonio, Salto Andrecito, *Morrone et al. 1388* (MO [2]); Guaraní, Predio Guaraní, junto a la casa de guardaparques, *Tressens et al. 5910* (F, NY, US). BRAZIL. **Paraná:** Mun. Guarapuava, Serra da Esperança, *Hatschbach 7384* (F); Mun. Laranjeiras do Sul, Rio das Pedras, *Hatschbach & Pereira 13071* (US); Vittorino, *Hatschbach 22679* (BM, F, W); Mun. Gal. Carneiro, Passo da Galinha, *Hatschbach 30713* (BM, NY); Itaperussú, *Jonsson 1005a* (F); Fazenda Reserva, ca. 60 km SW of Guarapuava, *Lindeman & de Haas 4915* (K [2], NY). **Rio Grande do Sul:** Tres Arroios, S. Almeida, BR 153, *Butzke et al. 7468* (US); Mun. São Marcos, Linha Feijó, *Kegler 286* (NY, US); Mun. Caixas do Sul, Forqueta, *Kegler 1301* (US); Mun. Caixas do Sul, Vila Oliva, *Kegler 1325* (US); São Francisco de Paula, no paradeiro da estrada para Taquara, *Mentz & Sobral 215* (NY); sentre o rio Tainhas e Princesa do Campo, *Pabst 6693 & Pereira* (F, NY, US); Vila Oliva p. Caixas, *Rambo 44621* (W); Kappesberg, p. Montenegro, *Rambo 52193* (US [2]); São Francisco de Paula, Carapina, *Rossato et al. 2484* (G, US); Morro Zeuter, Dois Ermãos, *Sehnem 12505* (US); Linha Imperial, Nova Petrópolis, *Sobral et al. 7991* (F); Par. de Espigão Alto, Barrancão, *Stehmann 728* (NY); Barra do Ouro, estrada para Riozinho, *Stehmann et al. 1524* (NY); Cambará, *Stehmann ICN 111359* (NY); Faxinal, Cambará do Sul, *Stehmann & Sobral ICN 111362* (NY); Mun. São Francisco de Paula, estrada para Taquara, *Wasum 1174* (G, US), *Wasum 1422* (US); Caixas do Sul, Jardim Botânico, *Wasum et al. 9015* (G, US). **Santa Catarina:** Faz. Laranja, Bom Jardim, S. Joaquim, *Reitz & Klein 7867* (NY); Urupema, São Joaquim, *Reitz & Klein 14584* (US); Rio Lavatudo, São Joaquim, *Reitz & Klein 15947* (US); Potreiro Grande, Mafra, *Reitz & Klein 17422* (F). PARAGUAY. **Itapuá:** Pirapó, Centro de Desarrollo Forestal, *Pérez 173* (MO).

16. Solanum pseudodaphnopsis L. A. Mentz & Stehmann, Novon 13: 97. 2003. TYPE: Brazil. Paraná: Paranaguá, Matinhos, 20 Sep. 1946, *G. Hatschbach 382* (holotype, MBM not seen; isotypes, BM!, PACA not seen, US 00810597!, US 00810597!, W!).

Shrubs to 1.7 m; branches woody, cylindrical, dark green to almost dark brown, glabrate, apical branches light, tinged in green or gold; new growth sparsely to densely covered with dendritic-echinoid trichomes; sympodial units unifoliate, less commonly difoliate and geminate. Leaves 5–12.5 × 1.5–5.5 cm, obovate, coriaceous and shiny, drying olive green to cinereous, glabrous or with a few dendritic-echinoid trichomes adaxially along the veins, glabrous or with a few dendritic-echinoid trichomes along the midrib abaxially, the base attenuate, the margins slightly revolute in dry material, the apex obtuse, rounded or slightly acute; primary veins 4 to 7 pairs, drying yellow abaxially; petiole 0.3–0.5 cm, sparsely pubescent with dendritic-echinoid trichomes. Inflorescences opposite the leaves or occasionally internodal, simple or rarely branched, 1–4 cm, 12- to 19-flowered, the peduncle to 2 cm, entire inflorescence pubescent with dendritic-echinoid trichomes; pedicels at anthesis slender, to 2 cm, sparsely pubescent with dendritic-echinoid trichomes, articulated at the base; pedicel scars ca. 1 mm apart, not overlapping, beginning 1/3 to 1/2 of the way from the base of the inflorescence; buds ellipsoid, the corolla soon exserted from the calyx tube. Flowers apparently all perfect; calyx tube conical, ca. 2 mm long, the lobes ca. 2 mm, ovate, sparsely dendritic-echinoid pubescent adaxially, glabrous abaxially; corolla 1.5–2 cm diam., white, lobed ca. 3/4 of the way to the base, the lobes reflexed at anthesis, glabrous or with scattered dendritic-echinoid trichomes adaxially, the tips of the lobes with a few dendritic-echinoid trichomes, otherwise papillate; anthers 2–3 × ca. 0.5 mm, poricidal at the tips, the pores teardrop-shaped; free portion of the filaments less than 0.1 mm long, the filament tube ca. 0.5 mm; ovary glabrous; style to 7 mm; stigma a thickened area at the tip of the style, minutely papillose. Fruit a globose, glabrous berry, to 1 cm diam., green; fruiting pedicels woody, somewhat deflexed, to 2.5 cm long, ca. 1 mm diam. at the base, ca. 2.5 mm diam. at the apex; seeds ca. 3 × 2.5 mm, ovoid-reniform, brown, the surfaces minutely pitted, nearly smooth.

Distribution. Restricted to the coastal sandy habitats of restinga vegetation in Santa Catarina and Paraná in southern Brazil; growing in open places and in gaps along the borders of coastal rain or swamp forest at about sea level.

Common names. Brazil. Paraná: "canema-mirim, caneminha, canema do brejo" (*Hatschbach 382*).

Discussion. Solanum pseudodaphnopsis is easily recognized by its obovate, leathery, glabrous, or very sparsely pubescent leaves with delicate, dendritic-echinoid trichomes. The leaves dry a distinctive olive-green color. The trichome branches of *S. pseudodaphnopsis* are not as congested as the true echinoid trichomes found in members of the Brevantherum clade (e.g., *S. erianthum* D. Don or *S. rugosum* Dunal) or in the *S. nitidum* Ruiz & Pav. species group of the Dulcamaroid clade (e.g., *S. storkii* C. V. Morton & Standl.), but the branches are more tightly packed along the axis than other related species in the Geminata clade (sensu Bohs, 2005). *Solanum pseudodaphnopsis* is a member of the *S. arenarium* species group and within that group is most similar to *S. arenarium*, differing in its larger, obovate leaves and much sparser, somewhat echinoid trichomes. *Solanum pseudodaphnopsis* also is morphologically similar to *S. cassioides* of the *S. nudum* species group, but differs from that species in its leaf shape, ovoid-reniform seeds, and simple inflorescences; within the *S. nudum* species group, *S. cassioides* is related to *S. trachytrichium*. Both species possess peculiar thick-based trichomes not present in *S. arenarium* and *S. pseudodaphnopsis*. *Solanum arenarium* is a species of upland forests in southeastern Brazil, mainly on granitic hills, at elevations to ca. 300 m, while *S. pseudodaphnopsis* is restricted to the restinga habitat at sea level.

Solanum pseudodaphnopsis occurs in a very restricted and threatened habitat type, the coastal restinga of Brazil (see Mentz & Stehmann, 2003). It is known from very few (10 cited in the original description) collections along a narrow, ca. 100–150 km long, coastal strip of critically endangered habitat (Falkenberg, 1999). Based on these observations, it can be assigned a preliminary conservation status of Endangered (EN) using IUCN criteria (IUCN, 2001), but may indeed turn out to be Critically Endangered (CR) when detailed population data become available.

Additional specimens examined. BRAZIL. **Paraná:** Guaratuba, Rio da Praia, *Hatschbach 10198* (US); Mun. Paranaguá, Rio da Vila, *Hatschbach 43175* (F).

ADDITION TO THE *SOLANUM DOLOSUM* SPECIES GROUP

Spindly shrubs or hemiepiphytes; young stems and leaves variously pubescent, strongly zigzag; sympodial units unifoliate. Leaves simple, linear to ovate, glabrous to variously pubescent, the apex long-acuminate, the margins of the apex with minute ciliate trichomes. Inflorescences opposite the leaves or internodal, strongly zigzag. Flowers white, usually less than 1 cm diam., the lobes reflexed at anthesis. Fruit a globose green berry; fruiting pedicels deflexed; seeds ovoid-reniform.

Distribution. Species of the group occur in montane Andean cloud forests from Colombia to Bolivia.

17. Solanum naucinum S. Knapp, Ann. Missouri Bot. Gard. 92: 251. 2005. TYPE: Peru. Pasco: Prov. Oxapampa, 4–5 km N of Mallampampa, 2400 m, 10°02′S, 75°45′W, 22 Jan. 1984, *Smith & Canne 5793* (holotype, USM!; isotype, MO!).

Small shrub to 50 cm; young stems and leaves densely golden pubescent, the trichomes 0.5–1 mm, dendritic, uniseriate with single-celled branches; older stems glabrescent, thin and flexuous; bark of the older stems pale brown; sympodial units unifoliate, occasionally difoliate and geminate on non-reproductive nodes. Leaves 7–15 × 1.5–3.2 cm, narrowly elliptic to narrowly oblanceolate or lanceolate, glabrous adaxially, pubescent abaxially on the veins and lamina with golden uniseriate dendritic trichomes to 1.5 mm, the trichome branches unicellular, pubescence denser along the veins, the apex long-acuminate, blunt at the extreme tip, the margins entire, slightly revolute, the base acute, sometimes somewhat oblique; primary veins 8 to 11 pairs, these looping to form a distinct marginal vein; petiole 0.3–0.6 cm, densely pubescent; minor leaves on non-reproductive nodes smaller, but similar in shape to the major leaves. Inflorescences opposite the leaves, simple, 5–8 cm, 8- to 10-flowered, densely pubescent with golden dendritic trichomes to 1 mm; pedicels at anthesis not seen, articulated at the base; pedicel scars spaced 2–4 mm apart, beginning ca. 1 cm from base of inflorescence; buds not seen. Flowers white (fide *Smith & Canne 5793*), not seen. Fruit a globose, green (immature?) berry, ca. 1 cm diam., drying mustard yellow on herbarium specimens; fruiting pedicels 1–1.2 cm, pendent, ca. 1 mm diam. at the base, ca. 2 mm diam. at the apex; calyx lobes in fruit ca. 3 mm, deltate, pubescent with golden dendritic trichomes; seeds ca. 3 × 2 mm, not mature in fruit examined, ovoid-reniform to slightly flattened, the surfaces minutely pitted, the margins not incrassate.

Distribution. Only known from the type specimen collected in the montane forests of the Cordillera de Yanachaga (site of Parque Nacional Yanachaga-Chemillén) in the Department of Pasco, Peru, at about 2400 m.

Discussion. *Solanum naucinum* is a member of the *Solanum dolosum* C. V. Morton ex S. Knapp species group (sensu Knapp, 2002a), with unifoliate sympodia on reproductive nodes, filamentous inflorescences, and long-acuminate leaves with ciliate margins near the apex. It differs from all other species in the group in its distinctive golden dendritic pubescence. Like the other taxa in the *S. dolosum* species group, *S. naucinum* is a spindly shrub, possibly also growing as a hemiepiphyte in its cloud forest habitat. The seeds in the fruits on the type specimen are immature, but appear to be ovoid-reniform without incrassate margins; however, mature fruits and flowers are needed to complete the morphological description of this rare species. *Solanum naucinum* is apparently an extremely rare plant; no new collections of this rare species have come to light since the collection of the type specimen in 1984. *Solanum naucinum* shares an elongate inflorescence with widely spaced pedicel scars with *S. gonyrhachis* S. Knapp of Bolivia.

Solanum naucinum is of uncertain conservation status (IUCN, 2001) as it is known only from the type, and our knowledge is limited due to lack of collections. It has been given the status of Data Deficient (DD) (Knapp et al., 2007), but it is likely to be Endangered (EN) or Critically Endangered (CR) due to low population size (common in other members of the *S. dolosum* species group) and very restricted range (Knapp, 2005).

SPECIES INCERTAE SEDIS

18. Solanum sumacaspi S. Knapp, Ann. Missouri Bot. Gard. 92: 248. 2005. TYPE: Peru. Cusco: Urubamba, rd. from Urubamba to Quillabamba, betw. Ollantaytambo & Abra Malaga, 13°12′15″S, 72°17′49″W, ca. 3500 m, 12 Sep. 2002, *M. Ackermann & D. Kollehn 289* (holotype, USM!; isotypes, BM!, BSB!, HUSA not seen, M!, NY!).

Small shrubs to 2 m tall; young stems and leaves minutely and sparsely papillate, soon completely glabrous, pale greenish yellow and shiny, a few (at most 1 or 2) simple uniseriate trichomes sometimes present on very new stems; older stems ridged, shiny; bark of the older stems and trunks pale greenish white, exfoliating; sympodial units difoliate, apparently geminate, the inflorescences borne at the branch tips and overtopping the leaves. Leaves simple, elliptic, completely glabrous adaxially and abaxially, shiny, thick and fleshy, drying olive green adaxially, pale bright yellowish green abaxially; major leaves 3–11 × 1.3–5 cm, the apex acute to somewhat truncate, the base attenuate onto the petiole; primary veins 5 to 10 pairs, raised and yellowish green adaxially, prominent and bright yellow abaxially; petioles 0.1–1 cm, ridged, the base remaining as a prominent scar on the older stems; minor leaves not differing from the major ones in size or shape. Inflorescences opposite the leaves, simple, 1–2 cm, 7- to 10-flowered, glabrous and shiny, the peduncle 0.5–1 cm; pedicels at anthesis somewhat deflexed, 0.5–1 cm long, tapering from the abrupt base of the calyx tube to a slender base 0.5–0.8 mm diam., green and shiny, articulated at the base; pedicel scars widely spaced ca. 2 mm apart, the pair of scars closer than the distance between the scar pairs, flowers borne from near the base of the inflorescence; buds when very young appearing globose, the corolla soon exserted from the calyx lobes, the buds later becoming ellipsoid just before anthesis. Flowers all apparently perfect; calyx tube 1.5–2 mm, broadly open and conical, the lobes 2–2.5 mm, deltate to rounded, glabrous, the margins thickened and drying white, the tip with a thickened mucro ca. 1 mm which may be swollen in fresh material, occasionally notched; corolla white or cream-colored, 1.4–2.5 cm diam., lobed nearly to the base, the lobes planar or somewhat campanulate at anthesis, glabrous on both surfaces, the tips of the lobes minutely papillose and somewhat cucullate; filaments with the free portion ca. 1 mm long, the tube ca. 0.25 mm long to absent; anthers 5–6 × 1–1.5(–2) mm, poricidal at the tips, the pores teardrop-shaped, the tips thickened and paler; ovary glabrous; style straight, 1–1.2 mm; stigma capitate, green. Fruit and seeds not known.

Distribution. In high secondary forests near steppeland in southern Peru, from 2100–3400 m, with most collections from the vicinity of Cusco.

Discussion. *Solanum sumacaspi* was included in the delimitation of *S. daphnophyllum* Bitter, a similarly glabrous species from Bolivia in the *S. nudum* species group, with some reservations in the monograph of section *Geminata* (Knapp, 2002a). Additional collections confirmed the distinctness of *S. sumacaspi*, both morphologically and in habitat. *Solanum daphnophyllum* is a species of middle to high elevation (700–2800 m), dry to semi-humid forests on the eastern Andean slopes from central Bolivia to the Department of Puno in Peru, while *S. sumacaspi* is only found in disturbed forests in much higher elevations (2100–3500 m) in grassland (puna)/forest transition areas in the Urubamba River drainage. Morphologically, *S. sumacaspi* differs from *S. daphnophyllum* in its more elongate inflorescences with more widely spaced pedicel scars and in its pale green, exfoliating bark. *Solanum daphnophyllum* has inflorescences usually only ca. 1 cm long and dark reddish brown shiny bark on all stems. The apparently geminate sympodial units also differentiate *S. sumacaspi* from *S. daphnophyllum*, which has difoliate, but not geminate, units.

Fruiting material is lacking for *Solanum sumacaspi*, preventing its firm allocation to one of the putative species groups of the Geminata clade (section *Geminata*, sensu Knapp, 2002a). Should the seeds be flattened-reniform, *S. sumacaspi* is likely to be a member of the *S. nudum* species group (sensu Knapp, 2002a), along with *S. daphnophyllum*. It differs from other completely glabrous members of the *S. nudum* species group in its unwinged pedicels, deltate calyx lobes, and high elevational distribution.

Solanum sumacaspi also morphologically resembles two species in the *S. arboreum* species group (sensu Knapp, 2002a) in its showy inflorescences of flowers all apparently opening at once: *S. gratum* Bitter of the Cordillera de la Costa in Venezuela and *S. plowmanii* S. Knapp of the western Andean slopes in Peru and Ecuador. The shiny stems also are similar to *S. goniocaulon* of the eastern Andean slopes of northern Peru and southern Ecuador, also of the *S. arboreum* species group. It can be differentiated from all those species by the combination of its yellowish exfoliating bark, shiny leaves that dry a very pale green, its non-anisophyllous leaves, and its high-elevation southern Peruvian distribution.

Solanum sumacaspi appears to be relatively common in the narrow Cusco area. It can tentatively be assigned a conservative preliminary conservation status of Endangered (EN) based on IUCN criteria (IUCN, 2001) of range (< 5000 km^2), number of locations (< 5 to 6), and habitat disturbance; the species was treated as Data Deficient (DD) by Knapp et al. (2007). Further investigations at the population level, however, may reveal a more significant threat status. Label data indicate the species grows in disturbed forests, but this may be indicative of the highly altered state of the habitat in the region rather than indicative of the weedy status of *S. sumacaspi*.

Additional specimens examined. PERU. **Cusco:** Urubamba, Ollantaytambo, Huaytampo, *Calatayud et al. 966* (BM, MO, NY, USM), *Farfán et al. 373* (BM, CUZ not seen, HUT not seen, MO, NY, USM not seen); Urubamba, Yucay, Huaran, *Farfán & Tupayachi 424* (MO, NY); Urubamba, Macchu Picchu, above town of Pauqarcancha, *Peyton & Peyton 147* (MO); Urubamba, Macchu Picchu, along Inca trail in Tres Piedras Blancas, 1 km from Huayabamba, *Peyton & Peyton 1026, 1026b* (MO); Calca, Lares, Manto, *Valenzuela et al. 1214* (MO, NY).

REVISED KEY TO THE SPECIES OF THE GEMINATA CLADE

DICHOTOMOUS KEY TO THE SPECIES OF THE GEMINATA CLADE

In contrast to the keys in Knapp (2002a), here I include all the species of the Geminata clade in a single key, rather than breaking them up into the pragmatic species groups defined in that monograph. The key includes only species found in the New World; if you are in the Old World and encounter a species of the Geminata clade, it is *Solanum spirale* with red fruits on deflexed pedicels or the introduced *S. diphyllum* L. with orange fruits on erect pedicels (see Knapp, 2002a). I have tried to use vegetative characters as much as possible, largely because many of these plants are usually found sterile, and also because several species are known only from flower or fruit. The key should be used in conjunction with Table 2, where the geographic distribution of all the New World species of the Geminata clade is listed. Where two species differ radically in distribution but key out with the same lead, I have indicated their distribution in parentheses after the species name, e.g., couplet 5.

Key to the New World Species of the Geminata Clade, Including the *Solanum havanense* Species Group

- 1a. Mature leaves glabrous, with no well-developed trichomes more than a single cell long.
  - 2a. Sympodial units plurifoliate, difoliate, or unifoliate, never geminate.
    - 3a. Sympodial units plurifoliate or difoliate.
      - 4a. Inflorescence branched (> 2×).
        - 5a. Shrubs of river courses; leaves linear to lanceolate . . . . *S. palmillae* Standl. (Mexico); *S. monadelphum* Van Heurk & Müll. Arg. (E slope of Andes)
        - 5b. Not shrubs of river courses; leaves elliptic to obovate.
          - 6a. Stems strongly winged . . . . *S. alatirameum*
          - 6b. Stems not winged.
            - 7a. Fruit bright orange, on erect pedicels . . . . *S. argentinum*
            - 7b. Fruit green, on deflexed pedicels.
              - 8a. Sympodial units difoliate or trifoliate.
                - 9a. Leaves drying black; flowers greenish; plants of SE Brazil . . . *S. cordioides*
                - 9b. Leaves drying golden abaxially; flowers white; Andes . . . *S. laurifrons*
              - 8b. Sympodial units plurifoliate.
                - 10a. Leaves with resinous pit-like domatia in leaf axils abaxially . . *S. pabstii*
                - 10b. Leaves with no pit-like domatia . . . . *S. evonymoides*
      - 4b. Inflorescence simple, or at most furcate.
        - 11a. Flowers purple.
          - 12a. Fruit green, conical with a pointed tip; pericarp woody . . . . *S. conocarpum*
          - 12b. Fruit blue or blue-green, ellipsoid; pericarp thin.
            - 13a. New growth completely glabrous . . . . *S. troyanum*
            - 13b. New growth pubescent with appressed uniseriate trichomes . . . . *S. havanense*
        - 11b. Flowers white.
          - 14a. Leaves drying golden abaxially.
            - 15a. Shrubs with pale bark; Cordillera de Avila, Venezuela . . . . *S. gratum*
            - 15b. Lax shrubs with reddish brown bark; Andes of Colombia . . . . . *S. humboldtianum*
          - 14b. Leaves not drying golden abaxially.
            - 16a. New growth densely arachnoid pubescent, the trichomes soon deciduous; plants of SE Brazil . . . . *S. canoasense*
            - 16b. New growth glabrous; plants of N South America and the Caribbean.
              - 17a. Pedicels strongly winged; Jamaica . . . . *S. acropterum*
              - 17b. Pedicels not winged; South America.
                - 18a. Bark of mature stems pale and shiny; plants of high elevations . . . . *S. sumacaspi*
                - 18b. Bark of mature stems reddish brown; plants of low elevations, in river courses . . . . *S. imberbe* Bitter
    - 3b. Sympodial units unifoliate.
      - 19a. Inflorescence axis filiform; fruiting pedicels elongate.
        - 20a. Stems glabrous.
          - 21a. Inflorescence axis elongate, to 30 cm; leaf margins ruffled; W Andean slopes . . . . *S. leptorhachis* Bitter
          - 21b. Inflorescence congested, < 1 cm; leaf margins plane; Andean Peru . . . . *S. habrocaulon* S. Knapp
        - 20b. Stems variously pubescent, the trichomes usually golden.
          - 22a. Inflorescence axis elongate, to 30 cm; petals planar at anthesis . . . . *S. leptorhachis*
          - 22b. Inflorescence axis shorter; petals reflexed at anthesis.
            - 23a. Inflorescence 1- to 5-flowered.
              - 24a. Leaf bases acute . . . . *S. pertenue* Standl. & C. V. Morton
              - 24b. Leaf bases oblique . . . . *S. darienense* S. Knapp
            - 23b. Inflorescence 5- to 15-flowered, more elongate.
              - 25a. Stem trichomes 1–1.5 mm, usually curling . . . . *S. capillipes* Britton
              - 25b. Stem trichomes shorter, erect.
                - 26a. Calyx lobes minute, < 1 mm; plants of the northern Cordilleras in Venezuela and Colombia . . . . *S. dissimile* C. V. Morton
                - 26b. Calyx lobes deltate, longer; plants of E Andean slopes.
                  - 27a. Leaf margins ruffled; inflorescence axis not markedly zigzag . . . . *S. confine* Dunal
                  - 27b. Leaf margins plane; inflorescence markedly zigzag . . *S. gonyrhachis*
      - 19b. Inflorescence axis stout; fruiting pedicels not very elongate.
        - 28a. New growth variously pubescent, sometimes minutely so.
          - 29a. Trichomes of new growth golden, erect . . . . *S. longevirgatum* Bitter
          - 29b. Trichomes of new growth floccose, arachnoid . . . . *S. bahianum* (SE Brazil); *S. cornifolium* Dunal (N Andes)
        - 28b. New growth completely glabrous.

30a. Leaves markedly 3-veined from the base.

31a. Leaf venation with parallel secondary veins, looking like Melastomataceae . . . . *S. triplinervium* C. V. Morton

31b. Leaf venation not like Melastomataceae . . . . *S. cyclophyllum* S. Knapp

30b. Leaves not 3-veined from the base.

32a. Leaf margins ruffled; all orders of venation prominent . . *S. ombrophilum* S. Knapp

32b. Leaf margins plane; venation finely parallel or obscure.

33a. Venation obscure; fruiting pedicels erect . . . . *S. bellum* S. Knapp

33b. Venation finely parallel; fruiting pedicels deflexed . . . . *S. elvasioides*

2b. Sympodial units difoliate, geminate.

34a. Leaves of a geminate pair not markedly anisophyllous; minor leaves not differing in shape.

35a. Inflorescence axis variously pubescent, the trichomes uniseriate.

36a. Trichomes of inflorescence axis and new growth floccose, arachnoid . . . . *S. nigricans* (Mexico to Honduras); *S. maturecalvans* Bitter (Andes)

36b. Trichomes of inflorescence axis and new growth erect, usually golden.

37a. Fruit pubescent; leaves always petiolate . . . . *S. oppositifolium* Ruiz & Pav. (Amazonia); . . . . *S. turgidum* S. Knapp (Peninsula de Paria, Venezuela)

37b. Fruit glabrous; leaves petiolate or more usually sessile . . . . *S. sessile* Ruiz & Pav.

35b. Inflorescence axis glabrous or papillate.

38a. Leaves usually < 9 cm long, never repand.

39a. Leaves drying golden abaxially.

40a. Bark red and exfoliating; Mexico to Panama . . . . *S. tuerckheimii* Greenm.

40b. Bark not red and exfoliating; South America . . . . *S. gratum* (Cordillera de Avila, Venezuela); *S. plowmanii* (Ecuador and Peru)

39b. Leaves not drying golden abaxially.

41a. Fruiting pedicels not erect, slightly or strongly deflexed; South America . . . . *S. stipulatum* Vell. (SE Brazil); *S. barbulatum* (Andes)

41b. Fruiting pedicels erect; Central America.

42a. Calyx lobes long-triangular . . . . *S. ramonense* C. V. Morton & Standl.

42b. Calyx lobes quadrate to deltate . . . . *S. roblense* Bitter

38b. Leaves usually > 10 cm long, to 35 cm, often repand.

43a. Inflorescence branched (> 2×).

44a. Stems strongly winged; plants of SE Brazil . . . . *S. alatirameum*

44b. Stems terete; plants of N South America . . . . . *S. obovalifolium* Pittier ex Benítez . . . (Cordillera de la Costa, Venezuela); *S. robustifrons* (E Andean slope, Amazonia)

43b. Inflorescence simple, or at most furcate.

45a. Calyx lobes petaloid or long-triangular.

46a. Leaves drying pale green; plants of SE Brazil . . . . *S. warmingii* Hieron.

46b. Leaves drying brownish; plants of Bolivia to Argentina . . . . *S. heleonastes* S. Knapp

45b. Calyx lobes deltate.

47a. Inflorescence axis glabrous (in *S. lindenii* Rusby resinous); fruit < 2 cm diam. . . . . *S. lindenii* (Peru and Bolivia); . . . . *S. narcoticosmum* Bitter (Mexico and Central America)

47b. Inflorescence axis papillate; fruit > 2 cm diam. when mature.

48a. Stems winged; buds enclosed in calyx until just before anthesis . . . . *S. abitaguense* S. Knapp

48b. Stems terete; buds early exserted from calyx . . *S. cucullatum* S. Knapp

34b. Leaves of a geminate pair markedly anisophyllous; minor leaves differing in shape and size.

49a. Fruiting pedicels deflexed at maturity, often from weight of fruit.

50a. Fruiting pedicels stouter, not markedly longer than in flower; inflorescence axis congested, stout.

51a. Flowers 4-merous; anthers loosely connivent, sagittate . . . . *S. sagittantherum*

51b. Flowers 5-merous; anthers tightly connivent, not sagittate . . . . *S. leucocarpon*

50b. Fruiting pedicels elongate (longer than in flower); inflorescence axis usually filiform or thin.

52a. Minor leaves stipule-like, very small and orbicular; bark reddish . . . . *S. leptopodum* Van Heurck & Müll. Arg.

52b. Minor leaves various, not stipule-like; bark pale.

53a. Stems strongly winged; bark white and exfoliating; plants of SE Brazil . . *S. stipulatum*

53b. Stems terete; bark pale, but not exfoliating; plants of montane regions, Central and N South America . . . . *S. pastillum* S. Knapp (Central America); *S. hypocalycosarcum* Bitter (SW Ecuador)

49b. Fruiting pedicels erect at maturity.

54a. Fruit red or orange (occasionally bright yellow) at maturity; pericarp thin; seeds flattened, pale yellow.

55a. Fruit > 1 cm diam., red or orange-red; flowers > 1 cm diam., the corolla lobes planar . . . . *S. pseudocapsicum*

55b. Fruit < 1 cm diam., pale orange; flowers < 1 cm diam., the corolla lobes reflexed . . . . . *S. diphyllum*

54b. Fruit green; seeds ovoid, variously brown.

56a. Inflorescence branched.

57a. Inflorescence elongate, the pedicel scars relatively widely spaced; petals strongly reflexed . . . . . *S. sieberi* Van Heurck & Müll. Arg.

57b. Inflorescence congested, the pedicel scars overlapping; petals planar or slightly reflexed.

58a. Fruit glabrous; leaves sessile . . . . . *S. sessile*

58b. Fruit pubescent; leaves petiolate . . . . . *S. oppositifolium* (Amazonia); *S. turgidum* (Peninsula de Paria, Venezuela)

56b. Inflorescence simple or the flowers sessile.

59a. Calyx lobes long-triangular.

60a. Flowers sessile . . . . . *S. tanysepalum* S. Knapp

60b. Flowers not sessile, an inflorescence axis present.

61a. Inflorescence axis elongate, the pedicel scars spaced; buds ellipsoid . . . . . *S. irregulare* C. V. Morton

61b. Inflorescence axis stout, congested, the pedicel scars overlapping; buds globose.

62a. Rhizomatous shrubs; new growth sometimes golden puberulent; leaves sessile . . . . . *S. arboreum*

62b. Erect shrubs; new growth various; leaves petiolate . . . . . *S. ramonense* (Central America); *S. anisophyllum* Van Heurck & Müll. Arg. (E slopes of Andes, Amazonia)

59b. Calyx lobes deltate or rounded.

63a. Leaves with a well-differentiated petiole . . . . . *S. ripense* Dunal

63b. Leaves attenuate at base, the petiole not well-differentiated.

64a. Leaves shiny adaxially, the midrib keeled . . . . . *S. lucens* S. Knapp

64b. Leaves dull adaxially, the midrib not markedly keeled.

65a. Inflorescence axis with tiny golden erect trichomes . . . . . *S. oppositifolium*

65b. Inflorescence axis glabrous or pubescent, the trichomes not golden and erect.

66a. Small trees; buds elliptic . . . . . *S. sieberi*

66b. Rhizomatous shrublets; buds globose . . . . . *S. arboreum*

1b. Mature leaves with at least some well-developed trichomes more than a single cell long.

67a. Trichomes variously branched.

68a. Trichomes of new growth and leaves floccose, arachnoid, the structure and branching not easy to disentangle.

69a. Sympodial units not geminate.

70a. Pubescence dense on leaf undersurface, lamina not visible . . . . . *S. ochrophyllum* Van Heurck & Müll. Arg.

70b. Lamina clearly visible through pubescence of leaf undersurface.

71a. Trichomes in tufts in vein axils abaxially . . . . . *S. laevigatum* Dunal

71b. Trichomes on lamina or veins, not in tufts.

72a. Calyx lobes deltate; fruit sometimes pubescent; N South America . . *S. cornifolium*

72b. Calyx lobes absent, a mere rim; fruit glabrous; S Bolivia, Argentina . . . . . *S. platycypellon* S. Knapp

69b. Sympodial units difoliate, geminate.

73a. Pubescence dense on leaf undersurface, lamina not visible . . . . . *S. ochrophyllum*

73b. Lamina clearly visible through pubescence of leaf undersurface.

74a. Trichomes in tufts in vein axils abaxially, reddish . . . . . *S. laevigatum*

74b. Trichomes scattered on lamina or veins, or if in tufts, the trichomes grayish.

75a. Corolla 1.5–2.2 cm diam.; Andes . . . . . *S. maturecalvans*

75b. Corolla 1–1.3 cm diam.; Mexico to Honduras . . . . . *S. nigricans*

68b. Trichomes of new growth and leaves dendritic or echinoid, with distinct stiff branches.

76a. Inflorescence branched, > 2×, complex.

77a. Fruit orange when ripe, sometimes dirty yellowish orange . . . . . *S. argentinum*

77b. Fruit green or greenish yellow when ripe.

78a. Stems winged.

79a. Leaves geminate, petiolate . . . . . *S. chlamydogynum* Bitter

79b. Leaves not geminate, sessile . . . . . *S. delitescens*

78b. Stems terete.

80a. Sympodial units plurifoliate.

81a. Trichomes loose, weak, with elongate branches.

82a. Pubescence reddish, the branches of the trichomes congested . . . . . *S. venosum* Dunal

82b. Trichomes transparent, the branches of the trichomes loose . . . . *S. oblongifolium* Dunal

81b. Trichomes uniseriate, erect, the branches short.

83a. Pubescence gray, the trichomes somewhat floccose; leaf bases truncate and somewhat oblique; Andes . . . . *S. hypaleurotrichum* Bitter

83b. Pubescence golden or reddish; leaf bases acute; SE Brazil, Argentina, and Paraguay . . . . *S. oblongifolium*

80b. Sympodial units difoliate.

84a. Fruit glabrous . . . . *S. clivorum* S. Knapp

84b. Fruit pubescent, the trichomes minute and golden.

85a. Corolla 0.8–1 cm diam.; plants dioecious; coastal Ecuador and Peru . . . . *S. confertiseriatum* Bitter

85b. Corolla 1–1.5 cm diam.; plants not dioecious; Venezuela . . *S. turgidum*

76b. Inflorescence simple or at most furcate.

86a. Fruit red or orange at maturity.

87a. Trichomes mixed simple and dendritic; sympodial units difoliate or trifoliate . . *S. delicatulum*

87b. Trichomes all dendritic; sympodial units difoliate.

88a. Leaves linear . . . . *S. spissifolium* Sendtn.

88b. Leaves elliptic.

89a. Pubescence dense on both leaf surfaces; trichomes 1–2 mm, reddish brown . . . . *S. kleinii* L. B. Sm. & Downs

89b. Pubescence denser on undersides; trichomes 0.25–0.5 mm, yellow . . . . *S. pseudocapsicum*

86b. Fruit green at maturity.

90a. Leaves sessile or markedly decurrent on the petiole.

91a. Sympodial units not geminate; anthers obovoid; calyx lobes long-triangular . . . . *S. delitescens*

91b. Sympodial units geminate; anthers ellipsoid; calyx lobes deltate or triangular.

92a. Fruit pubescent; corolla > 1 cm diam.; minor leaves orbicular . . . . *S. malletii* S. Knapp

92b. Fruit glabrous; corolla < 1 cm diam.; minor leaves elliptic . . . . *S. xanthophaeum* Bitter (Andes); *S. pseudodaphnopsis* (restingas of SE Brazil)

90b. Leaves distinctly petiolate.

93a. Sympodial units unifoliate.

94a. Inflorescence stout, congested; leaves coriaceous, thick . . *S. nutans* Ruiz & Pav.

94b. Inflorescence filiform, the pedicel scars widely spaced; leaves membranous . . . . *S. naucinum*

93b. Sympodial units difoliate.

95a. Adaxial leaf surface densely pubescent with simple trichomes; leaves large and repand . . . . *S. superbum* S. Knapp

95b. Adaxial leaf surface variously pubescent or glabrous, the trichomes not simple; leaves not large and repand.

96a. Adaxial leaf surface shiny and glabrous.

97a. Trichomes of the abaxial leaf surface found in tufts in the vein axils.

98a. Seeds flattened, yellowish brown; flowers usually < 1 cm diam. . . . . *S. nudum*

98b. Seeds ovoid, dark brown; flowers > 1 cm diam. . . . *S. smithii*

97b. Trichomes of abaxial leaf surface on lamina and veins, not in tufts.

99a. Trichomes of abaxial leaf surface mostly confined to the veins, echinoid . . . . *S. microleprodes* Bitter

99b. Trichomes of abaxial leaf surface on the lamina and veins, dendritic.

100a. New growth resinous; Andes . . . . *S. lindenii*

100b. New growth not resinous; SE Brazil . . . *S. arenarium*

96b. Adaxial leaf surface variously pubescent.

101a. Seeds flattened.

102a. Marginal leaf trichomes with multicellular bases . . *S. cassioides*

102b. No leaf trichomes with multicellular bases.

103a. Leaves bullate . . . . *S. youngii* S. Knapp

103b. Leaves not bullate.

104a. Leaves densely red papillate and dendritic pubescent, the trichomes weak and transparent . . . . *S. psychotrioides* Dunal

104b. Leaves with uniseriate trichomes only, not densely papillate . . . . *S. tovarii* S. Knapp

101b. Seeds ovoid.

105a. Fruit densely pubescent with densely branched trichomes; plants of SE Brazil . . . . *S. gnaphalocarpon*

105b. Fruit glabrous; plants of the Andes.

106a. Leaf surfaces abaxially yellowish from dense pubescence . . . . *S. tunariense* Kuntze

106b. Leaf surfaces clearly visible abaxially, the trichomes loose . . . . . *S. callianthum* C. V. Morton

67b. Trichomes simple or at most furcate.

107a. Trichomes of leaf undersurface in tufts in vein axils or tucked along midrib, not on lamina or veins (if so very few trichomes).

108a. Inflorescences branched (> 2×).

109a. Leaves thick and fleshy; plants of high elevations in central Peru . . . . *S. amblophyllum*

109b. Leaves membranous; plants of lower elevations, coastal regions.

110a. Petals strongly reflexed at anthesis; buds ellipsoid . . . . *S. sieberi*

110b. Petals campanulate at anthesis; buds globose . . . . . . *S. campaniforme* Roem. & Schult.

108b. Inflorescences simple (or at most furcate).

111a. Flowers fleshy, > 1.5 cm diam.; lobes ± planar at anthesis.

112a. Calyx lobes petaloid.

113a. Plants drying black . . . . *S. caavurana* Vell.

113b. Plants drying pale green . . . . *S. warmingii*

112b. Calyx lobes deltate, not petaloid.

114a. Fruiting pedicel swollen apically.

115a. Leaf base attenuate . . . . *S. corumbense* S. Moore

115b. Leaf base acute to cuneate . . . . *S. leucocarpon*

114b. Fruiting pedicels not markedly swollen apically.

116a. Leaves not geminate . . . . *S. validinervium* Benítez & S. Knapp

116b. Leaves geminate.

117a. Leaf trichomes reddish, weak and collapsing, on lamina . . . *S. psychotrioides*

117b. Leaf trichomes white, uniseriate and erect . . . *S. oblongum* Ruiz & Pav.

111b. Flowers < 1.5 cm diam.; lobes reflexed at anthesis.

118a. Flower buds ellipsoid (elongate) . . . . *S. sieberi* (coastal N South America); . . . . *S. deflexiflorum* Bitter (Andes).

118b. Flower buds globose.

119a. Sympodial units unifoliate . . . . *S. mapiricum* S. Knapp

119b. Sympodial units difoliate, usually geminate.

120a. Flower buds large; flowers 1.5–2 cm diam.

121a. Trichomes of leaf undersides moniliform; tepuis of Venezuela . . . .*S. tepuiense* S. Knapp

121b. Trichomes of leaf undersides uniseriate; Sierra Nevada de Santa Marta . . . . *S. lasiopodium* Dunal

120b. Flower buds smaller; flowers < 1.5 cm diam.

122a. Flower buds flattened . . . . *S. barbulatum*

122b. Flower buds globose.

123a. Stems winged . . . . *S. santosii* S. Knapp

123b. Stems terete.

124a. Bark of twigs white or very pale yellow, even on young stems; veins of leaf undersurface pale.

125a. Stems and inflorescence axis with simple uniseriate trichomes . . . . *S. gertii* S. Knapp

125b. Stems and inflorescence axis glabrous.

126a. Anthers unequal (3 long and 2 short), the pores never elongating . . . . *S. pseudoquina*

126b. Anthers all of equal length, the pores lengthening to slits with age.

127a. Inflorescence axis 1.2–6 cm; calyx lobes deltate . . . . *S. aphyodendron* S. Knapp

127b. Inflorescence axis 3–8 cm; calyx lobes quadrate . . . . *S. trichoneuron*

124b. Bark dark brown or reddish; veins drying dark.

128a. New growth densely floccose pubescent, the trichomes reddish . . . . *S. laevigatum*

128b. New growth glabrous or with scattered uniseriate trichomes, not floccose.

129a. Inflorescences of 1 to 2 flowers; calyx lobes long-triangular . . . . *S. monanthemon*

129b. Inflorescences with > 5 flowers; calyx lobes deltate to triangular.

130a. Inflorescence subumbellate, all flowers in the apical part . . *S. symmetricum* Rusby

130b. Inflorescence with flowers along entire axis . . . . *S. nudum*

107b. Trichomes of leaf undersurface on veins and lamina, not confined to vein axils.

131a. Pubescence of leaf undersurface on lamina (occasionally also denser on veins).

132a. Some trichomes of leaves and/or new growth with multicellular bases.

133a. Leaves scabrous, like sandpaper to the touch; trichomes unicellular, stiff . . . *S. trachytrichium*

133b. Leaves not scabrous; trichomes multicellular.

134a. Leaves geminate; Andes . . . . *S. psychotrioides*

134b. Leaves not geminate; Central America and N South America . . . . *S. vacciniiflorum* Standl. & L. O. Williams

132b. Trichomes uniseriate, without multicellular bases.

135a. Sympodial units unifoliate.

136a. Leaves sessile, decurrent onto the winged stem . . . . *S. foetens* S. Knapp

136b. Leaves petiolate, the stem tetete . . . . *S. quebradense* S. Knapp

135b. Sympodial units difoliate, geminate.

137a. Leaves of a geminate pair markedly anisophyllous, differing in size and shape.

138a. Leaf margins plane; trichomes stiff, curled in one direction; fruit yellow . . . . *S. falconense* S. Knapp

138b. Leaf margins ruffled; trichomes soft, yellowish; fruit green . . . . *S. erosomarginatum* S. Knapp

137b. Leaves of a geminate pair the same shape, but often differing in size.

139a. Inflorescence branched.

140a. Anthers unequal (3 long and 2 short), the pores never elongating . . . . *S. reitzii* L. B. Sm. & Downs

140b. Anthers equal, the pores lengthening to slits with age . . . *S. confertiseriatum*

139b. Inflorescence simple or at most furcate.

141a. Anthers unequal (3 long and 2 short), the pores never elongating . . . . *S. reitzii*

141b. Anthers equal.

142a. Flowers > 1.5 cm diam.

143a. Calyx broadly urceolate, constricted at apex of petiole . . . . *S. corumbense*

143b. Calyx conical . . . . *S. tovarii*

142b. Flowers < 1.5 cm diam.

144a. Flower buds ellipsoid . . . . *S. incomptum* Bitter

144b. Flower buds globose or obovoid.

145a. Flower buds obovoid; plants of the Bolivian yungas . . . . *S. chalmersii*

145b. Flower buds globose.

146a. Calyx lobes narrowly triangular . . . . *S. lasiocladum* S. Knapp

146b. Calyx lobes deltate . . . . *S. malacothrix* S. Knapp (Mexico); . . . . *S. intermedium* Sendtn. (Brazil)

131b. Pubescence of leaf undersurface confined to the veins, only occasionally a few trichomes on the lamina.

147a. Sympodial units difoliate to plurifoliate.

148a. Inflorescence branched.

149a. Flowers < 1 cm diam., not fleshy; fruit pubescent with minute golden trichomes . . . *S. confertiseriatum* (W Ecuador and Peru); *S. oppositifolium* (Amazonia)

149b. Flowers > 1 cm diam., fleshy; fruit glabrous.

150a. Leaves sessile . . . . *S. sessile*

150b. Leaves petiolate . . . . *S. rovirosanum* Donn. Sm.

148b. Inflorescence simple or at most furcate.

151a. Leaf trichomes reddish, weak and collapsing.

152a. Fruiting pedicels erect; trichomes all uniseriate . . . . *S. psychotrioides*

152b. Fruiting pedicels deflexed; some trichomes with multicellular bases . . . . *S. vacciniiflorum*

151b. Leaf trichomes white, uniseriate and erect.

153a. Leaves of a geminate pair anisophyllous, differing in size and shape . . *S. arboreum*

153b. Leaves of a geminate pair not markedly anisophyllous, differing only in size . . . . *S. dasyneuron* S. Knapp

147b. Sympodial units unifoliate.

154a. Inflorescence axis very elongate and slender, to 30 cm.
155a. Pubescence of leaf undersides minute, the trichomes usually unicellular . . . . *S. leptorhachis*
155b. Pubescence of leaf undersides of trichomes to 1 mm long, the trichomes uniseriate, multicellular . . . . *S. nematorhachis* S. Knapp (W Colombia); . . . . *S. tenuiflagellatum* S. Knapp (Cordillera de la Costa, Venezuela)
154b. Inflorescence not elongate and slender, usually < 2 cm long.
156a. Leaf apex long acuminate, the ultimate tip blunt.
157a. Flowers 0.4–0.5 cm diam., greenish white; leaf margins ruffled . . . . *S. yanamonense* S. Knapp
157b. Flowers 0.8–1 cm diam., white; leaf margins plane . . . . *S. dolosum*
156b. Leaf apex acute to somewhat acuminate, the tip acute.
158a. Stem densely pubescent with yellowish trichomes 1–1.5 mm long . . . *S. capillipes* (Trinidad); *S. valerianum* C. V. Morton & Standl. (Central America)
158b. Stem puberulent, the trichomes very short.
159a. Inflorescence 1- to 3-flowered; plants of Central America . . . *S. pertenue*
159b. Inflorescence > 5-flowered; plants of South America.
160a. Fruiting pedicels 1–1.5× their length in flower; calyx lobes < 0.5 mm long; Andes of Venezuela and Colombia . . . *S. dissimile*
160b. Fruiting pedicels 2–3× their length in flower; calyx lobes ca. 1 mm long; E Andean slopes and Amazonia . . . . *S. confine*

SYNOPTIC OBSERVATIONS ON THE SPECIES OF THE GEMINATA CLADE

This synoptic set of observations is intended to simplify the task of identifying a member of this large and, at first glance, very uniform group. Sterile plants of members of the Geminata clade are often difficult to identify, and even plants with either flowers or fruit can be difficult. I have included many leaf and whole plant characters so that sterile plants in many cases can be identified to a choice of a few taxa. Once this step has been done, the user can read the descriptions and match distributions in this paper and Knapp (2002a) and consider other characters not used in this list to the plant in hand. All descriptions of members of the Geminata clade are also presented on the Solanaceae Source website (<http://www.nhm.ac.uk/solanaceaesource>). In the following list, geographical regions and then character states are followed by a list of species epithets in alphabetical order. Epithets in parentheses indicate that the state is relatively uncommon in that species or occurs in only some populations of that species. A question mark (?) following a species epithet indicates that the character is likely to occur, but has not been absolutely verified. Epithets for species described in this paper are in italics. Species that vary in a particular character, for example in leaf trichome distribution, will be listed for each state present in that species. Not all relevant characters are considered; for example, I have listed fruit color other than green, but not fruits green—common in most species in the group. In this way, diagnostic states can be easily seen. Many species of the group are rather narrow endemics, occurring in only one country or region. Table 2 lists species recorded for each country of the Neotropics; this list must be used with care, as new collecting is constantly revealing range extensions in these rare forest plants.

Plants of Central America and Mexico: aphyodendron, arboreum, darienense, dasyneuron, diphyllum, imberbe, incomptum, leucocarpon, malacothrix, microleprodes, narcoticosmum, nigricans, nudum, palmillae, pastillum, pertenue, pseudocapsicum, ramonense, roblense, rovirosanum, tuerckheimii, vacciniiflorum, valerianum

Plants of southeastern Brazil: alatirameum, arenarium, bahianum, caavurana, campaniforme, *canoasense*, cassioides, *compressum*, *evonymoides*, gertii, gnaphalocarpon, intermedium, kleinii, pabstii, pseudocapsicum, pseudoquina, reitzii, restingae, santosii, spissifolium, stipulatum, trachytrichium, warmingii

Plants of Caribbean islands (including Trinidad and Tobago): *acropterum*, arboreum, capillipes, *conocarpum*, diphyllum, *havanense*, nudum, pseudocapsicum, sieberi, triste, *troyanum*

Shrubs of river courses, rheophytes (usually with very narrow leaves): amnicola, imberbe, monadelphum, palmillae, spissifolium, stipulatum

Plants growing in weedy thickets at roadsides: acuminatum, aphyodendron, caavurana, *chalmersii*, nudum, rovirosanum, sieberi, *sumacaspi*?, trichoneuron

Pagoda-like architecture (Chamberlain's or Prévost's model with tiers of plagiotropic branches): capillipes, confine, cruciferum?, darienense, dissimile, erosomarginatum, leptopodum, leptorhachis, morii, nematorhachis, pertenue, stipulatum, tuerckheimii, valerianum, yanamonense

Stems markedly winged: abitaguense, chlamydogynum, delitescens, foetens, goniocaulon, *humboldtianum*, oblongifolium

Bark of older stems exfoliating: incomptum, *sumacaspi*, tenuiflagellatum, tuerckheimii, vacciniiflorum

Sympodial units unifoliate: bahianum, bellum, capillipes, confine, cyclophyllum, darienense, dolosum, *elvasioides*, foetens, gonyrhachis, habrocaulon, *humboldtianum*, leptorhachis, longevirgatum, marantifolium, *naucinum*, nematorhachis, nutans, ochrophyllum, ombrophilum, pertenue, stipulatum, triplinervium, unifoliatum, valerianum, yanamonense

Plants completely glabrous, any trichomes not visible to the naked eye: *acropterum*, alatirameum, cordioides, diphyllum, *elvasioides*, evonymoides, pseudocapsicum (cultivated), *sumacaspi*, *troyanum*, warmingii

New growth resinous: amblophyllum, lindenii

Trichomes of new growth reddish when dry: (abitaguense), anisophyllum, arboreum, bahianum, (cucullatum), laevigatum, (nutans), psychotrioides, robustifrons, *sagittantherum*, superbum, vacciniiflorum, venosum

Leaf margins markedly undulate (ruffled): capillipes, confine, cruciferum, darienense, dissimile, erosomarginatum, leptopodum, leptorhachis, morii, nematorhachis, ombrophilum, pastillum, pertenue, stipulatum, valerianum, yanamonense

Leaf pubescence felty (arachnoid trichomes): bahianum, *canoasense*, cornifolium, hypaleurotrichum, laevigatum, maturecalvans, nigricans, ochrophyllum, platycypellon

Leaves bullate or markedly rugose: amblophyllum, maturecalvans, vacciniiflorum, youngii

Leaves drying black: alatirameum, caavurana, campaniforme, cordioides, dasyneuron, foetens, (lasiopodium), narcoticosmum, (symmetricum), (trachytrichium), *troyanum*

Leaves 3-veined from the base: cyclophyllum, triplinervium

Leaves with strongly parallel venation: *elvasioides*, triplinervium

Leaves sessile: alatirameum, delitescens, malletii, sessile, xanthophaeum

Leaves of a geminate pair anisophyllous, markedly unequal in size and differing in shape: anisophyllum, arboreum, erosomarginatum, hypocalycosarcum, irregulare, leptopodum, leucocarpon, lucens, malletii, ombrophilum, *sagittantherum*, tuerckheimii

Leaf and stem trichomes echinoid or Christmas-tree-like: *compressum*, gnaphalocarpon, hypaleurotrichum, nutans, *pseudodaphnopsis*, xanthophaeum

Trichomes dendritic or antler-like: arenarium, argentinum, callianthum, chlamydogynum, clivorum, *compressum*, confertiseriatum, *delicatulum*, erosomarginatum, gnaphalocarpon, kleinii, leucocarpon, lindenii, naucinum, (nigricans), nutans, oblongifolium, oblongum, pseudocapsicum, *pseudodaphnopsis*, smithii, spissifolium, superbum, triste, tunariense, youngii

Leaf trichomes simple, long and uniseriate: capillipes, *chalmersii*, (confertiseriatum), confine, corumbense, dasyneuron, erosomarginatum, falconense, foetens, incomptum, irregulare, lasiocladum, longevirgatum, malacothrix, monanthemon, nematorhachis, quebradense, superbum, tepuiense, tovarii, turgidum, valerianum

Leaf trichomes with enlarged bases: cassioides, trachytrichium, (psychotrioides), vacciniiflorum

Tufts of trichomes in the vein axils abaxially: acuminatum, aphyodendron, barbulatum, caavurana, campaniforme, *compressum*, cornifolium, laevigatum, lasiocladum, lasiopodium, leucocarpon, *monanthemon*, nudum, pseudoquina, psychotrioides, santosii, smithii, symmetricum, tepuiense, trichoneuron

Pit-like domatia in vein axils abaxially: *pabstii*

Pubescence uniform and dense on leaf undersides: arenarium, *argentinum*, callianthum, chlamydogynum, (*compressum*), (confertiseriatum), (corumbense), delitescens, erosomarginatum, gnaphalocarpon, hypaleurotrichum, (leucocarpon), longevirgatum, malacothrix, malletii, microleprodes, nutans, (oblongifolium), oblongum, ochrophyllum, pseudocapsicum, reitzii, superbum, tovarii, tunariense, valerianum, venosum, xanthophaeum, youngii

Leaves shiny adaxially, uniformly pubescent on the lamina abaxially: arenarium, lindenii, *pseudodaphnopsis*, tunariense

Leaves golden abaxially when dry (herbarium specimens): goniocaulon, gratum, *humboldtianum*, laurifrons, (plowmanii), tuerckheimii

Inflorescence branched many times: (acuminatum), alatirameum, amblophyllum, chlamydogynum, clivorum, *compressum*, confertiseriatum, cordioides, delitescens, *evonymoides*, hypaleurotrichum, (lasiopodium), laurifrons, monadelphum, (malletii), oblongifolium, (ombrophilum), oppositifolium, pabstii, (reitzii), (robustifrons), rovirosanum, sessile, (smithii), (tenuiflagellatum), triste, (turgidum), venosum, youngii

Flowers sessile, no inflorescence axis present (if so, very small): *canoasense*, cruciferum, delicatulum, dolosum, elvasioides, monanthemon, pertenue, tanysepalum

Inflorescence filiform, longer than 4 cm: gonyrhachis, leptorhachis, (*naucinum*), nematorhachis, stipulatum, tenuiflagellatum

Corolla green: cordioides, malletii, xanthophaeum, yanamonense

Corolla purple: *conocarpum*, *havanense*, *troyanum*

Corolla campanulate: campaniforme, *canoasense*, cassioides, (trachytrichium), validinervium

Corolla lobes strongly reflexed at anthesis: bellum, capillipes, *chalmersii*, cruciferum, deflexiflorum, diphyllum, dolosum, erosomarginatum, lasiocladum?, leptopodum, morii, ombrophilum, pertenue, sieberi, valerianum, yanamonense

Corolla lobes tomentose (not merely papillose on the tips and margins) without: arenarium, callianthum, chlamydogynum, clivorum, *compressum*, cornifolium, delitescens, gnaphalocarpon, hypaleurotrichum, kleinii, (lasiocladum), malletii, microleprodes, nutans, (quebradense), superbum, (triste), venosum, (xanthophaeum)

Calyx lobes petaloid or long-triangular: *acropterum*, caavurana, (arboreum), *delicatulum*, irregulare, marantifolium, pseudocapsicum, ramonense, spissifolium, warmingii

Calyx lobes orbicular (live plants): pastillum, *sumacaspi*

Anthers of unequal lengths (2 long, 3 short): pseudoquina, reitzii

Anthers strongly connivent: alatirameum, corumbense, *evonymoides*, leucocarpon, lindenii, (oblongum)

Anthers obovoid in shape, the base narrow: delitescens

Anthers sagittate at the base: amblophyllum, *chalmersii*, (*havanense*), *sagittantherum*

Anther pores small, never elongating to slits with age: *havanense*, pseudoquina, reitzii, *troyanum*

Fruiting pedicels erect: amnicola, anisophyllum, arboreum, bellum, cyclophyllum, diphyllum, kleinii, laevigatum, lucens, marantifolium, pseudocapsicum, ramonense, ripense, roblense, robustifrons, *sagittantherum*, spissifolium, triplinervium, turgidum, unifoliatum

Berries pubescent: abitaguense, callianthum, chlamydogynum, confertiseriatum, cornifolium, cucullatum, gnaphalocarpon, malletii, triste, turgidum

Berries pointed at the tip: *conocarpum*, nigricans, stipulatum

Berries > 3 cm at largest axis: abitaguense, *conocarpum*, cucullatum, superbum

Berries red or orange at maturity: *argentinum*, *delicatulum*, kleinii, pseudocapsicum, spissifolium

Berry purple or bluish: *acropterum*?, *havanense*, *troyanum*

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APPENDIX 1. List of taxa in the Geminata clade treated in this paper. Collections of these 18 species are cited in Appendix 2, while other species in the clade are treated only in Table 1, the key, and the synoptic observations. The numbering system here applies to Appendices 1 and 2 only.

Solanum havanense species group
  1. *Solanum acropterum* Griseb.
  2. *Solanum conocarpum* Dunal
  3. *Solanum havanense* Jacq.
  4. *Solanum troyanum* Urb.
Solanum pseudocapsicum species group
  5. *Solanum argentinum* Bitter & Lillo
  6. *Solanum delicatulum* L. B. Sm. & Downs
Solanum nudum species group
  7. *Solanum chalmersii* S. Knapp
  8. *Solanum monanthemon* S. Knapp
  9. *Solanum pabstii* L. B. Sm. & Downs
Solanum leucocarpon species group
  10. *Solanum evonymoides* Sendtn.
Solanum amblophyllum species group
  11. *Solanum elvasioides* S. Knapp
Solanum arboreum species group
  12. *Solanum humboldtianum* Granados-Tochoy & S. Knapp
  13. *Solanum sagittantherum* Granados-Tochoy & C. I. Orozco
Solanum nigricans species group
  14. *Solanum canoasense* L. B. Sm. & Downs
Solanum arenarium species group
  15. *Solanum compressum* L. B. Sm. & Downs
  16. *Solanum pseudodaphnopsis* L. A. Mentz & Stehmann
Solanum dolosum species group
  17. *Solanum naucinum* S. Knapp
Species incertae sedis
  18. *Solanum sumacaspi* S. Knapp

APPENDIX 2. Exsiccatae for species treated in detail in this paper.

Acevedo, P. R. 5437 (2); *Ackermann, M. & Kollehn, D. 289* (18); *Adams, C. D. 6333* (3), *11833* (3), *12827* (4), *11230* (4); *Aguilar, R. 161* (5); *Aguilar, R. M. 304* (5); *Alain, Bro. 2394* (3), *2396* (3), *4292* (3), *5280* (3); *Almeida, J. 16* (10); *Alvarez, M. R. 226* (5); *Amorim, A. M. 653* (10); *Araque M., J. & Barkley, F. A. 19Ar482* (5); *Asprey, G. F. 2353* (3).

Baer, G. A. 110 (5); *Bailey, L. H. 731* (3); *Bartlett, H. H. 19631* (5), *19750* (5), *19683* (5), *19888* (5), *20321* (5), *20474* (5); *Bastian, E. 1347* (5); *Beck, S. G. 6459* (5), *24480* (7); *Bernardi, L. 20283* (5); *Bianchi, E. M. 12* (5); *Blanchet, J. S. 3096* (10), *3096A* (10); *Borsini, O. 744* (5), *6721* (5); *Bourdy, G. 2017* (5); *Brito, H. S. & Da Vinha, S.G. 117* (10); *Brito, T. H. & Judziewicz, E. J. 3986* (10); *Britton, N. L. 401* (3), *591* (4), *891* (3), *1073* (3), *1511* (3), *2831* (3), *2294* (1), *2294* (1), *2807* (1), *4137* (1), *4213* (3); *Britton, N. L. & Earle, F. S. 7609* (3); *Britton, N. L. & Hollick, A. 2058* (3), *2063* (3), *2807*

(1); *Brizuela, A. 523* (5), *893* (5), *1145* (5), *1334* (5); *Brizuela, J. 166* (5), *744* (5); *Brunt, M. 2200* (3); *Buchtien, O. 7472* (7); *Buratovich, F. 446* (5); *Burkart, A. 2585* (5); *Burkart, A. & Troncoso, N. 12017* (5); *Butzke, A. et al. 7468* (15).

Cabrera, A. L. et al. 31020 (5), *31427* (5); *Cadena, J. J. 78* (12); *Calatayud, G. et al. 966* (18); *Callejas, R. et al. 1618* (10); *Cárdenas, M. 2525* (5), *4754* (5); *Carvalho, A. M. de et al. 4121* (10), *6672* (10); *Castellanos, ? 14825* (5); *Charpin, A. 25819* (5), *23928* (5); *Charpin, A. & Lazare, J. J. 23928* (5); *Charpin, A. S. & Novara, L. 20717* (5); *Claussen, P. s.n.* (10), *200* (10); *Combs, R. 114* (3); *Comisión para la Medición de un Arco de Meridiano 896* (5); *Cordini, J. I. 67* (5); *Cozzo, ? 77* (5); *Curtiss, A. H. 716* (3); *Custodio Filho, A. 265* (10).

Degen, R. & Mereles, F. 3149 (5), *3176* (5), *3179* (5); *Descole, ? 1494* (5); *Dos Santos, E. B. & Alves, M. C. 224* (10); *Dos Santos, T. S. 1051* (10).

Eiten, G. & Clayton, W. D. 5790 (6); *Ekman, E. L. 10555* (3), *12876* (3); *Euponino, A. & Da Vinha, S. G. 481* (10).

Farfán, J. et al. 373 (18); *Folli, D. A. 1040* (10); *Fries, R. E. s.n.* (5); *Fuentes, A. & Novarro, G. 1958* (5).

Glaziou, A. F. M. 8856 (10); *Gramaja, A. 16* (5); *Granados-Tochoy, J. C. et al. 389* (12), *844* (12), *860* (12), *888* (13).

Harris, W. 8530 (4), *8681* (4), *9000* (4), *10036* (3), *10231* (3), *10237* (3), *10298* (1), *10718* (3), *10752* (1); *Harris, W. & Britton, N. L. 10723* (1); *Hatschbach, G. 382* (16), *10198* (16), *15030* (9), *22679* (15), *22707* (9), *30713* (15); *Hatschbach, G. & Pereira, E. 13071* (15); *Hatschbach, G. et al. 72547* (9); *Hawkes, J. G. 36* (12); *Hayward, K. J. 2078* (5); *Herb. Bot. Dept. Jamaica 6175* (3), *6248* (3); *Herb. Hoehne 38942* (5); *Hoehne, F. C. 3042* (10); *Hoehne, W. s.n.* (6), *s.n.* (6); *Howard, R. A. 5740* (3), *6590* (3), *15024* (1); *Howard, R. A. & Proctor, G. R. 13765* (3), *14365* (4); *Huidobro, A. M. R. 617* (5), *536* (5), *3045* (5); *Humboldt, F. W. H. A. & Bonpland, A. s.n.* (12); *Hunziker, A. T. 1064da* (5).

Ibarrola, T. S. 3854 (6); *Ibisch & Ibisch 93.1477* (8); *Idrobo, J. M. 5437* (12); *Itaipú Binacional 668* (5).

Jack, J. G. 7317 (3); *Jardim, A. & Rosas-Hurtado, N. 1550* (5); *Jiménez, J. J. 1907* (3); *Jorgensen, P. 2622* (5); *Jørgensen, P. M. et al. 44* (11).

Kallunki, J. A. et al. 706A (10); *Kegler, A. 286* (15), *1301* (15), *1325* (15); *Killeen, T. et al. 4209* (5); *Klein, R. 4567* (9); *Krapovickas, A. & Cristóbal, C. 17526* (5), *27143* (5), *27157* (5), *30423* (5), *46303* (5); *Krapovickas, A. & Schinini, A. 30909* (5), *31246* (5), *39269* (5); *Krapovickas, A. et al. 28017* (5), *28397* (5), *56552* (5); *Kummrow, R. 2410* (14); *Kuroiwa, N. & Maeda, A. 2332* (5).

León, Bro. 7135 (3); *Lewis, C. B. s.n.* (1); *Lillo, M. 3343* (5), *9837* (5); *Lima, J. C. A. & Messias Santos, M. 144* (10); *Lindeman, J. C. & Haas, J. H. de 4915* (15), *5302* (15); *Lozano-C., G. 98* (12); *Luna, F. E. 1049* (5); *Luno, M. Y. de 24* (5); *Luteyn, J. L. & Dorr, L. J. 13722* (7).

MacFadyen, J. s.n. (3); *Madsen, J. E. et al.* (11); *Maldonado, R. 227* (5); *Malvárez, M. R. 305* (5), *497* (5), *653* (5), *691* (5); *Malvárez, R. 155* (5), *1335* (5), *1401* (5); *March, W. T. 1666* (3); *Martins, F. R. et al. 12361* (10); *Martius, C. F. P. von 625* (10); *Mattos Silva, L. A. et al. 376* (10), *1298* (10), *1378* (10); *Maxon, W. R. 2206* (4); *Mentz, L. A. & Sobral, M. 188* (9), *215* (15); *Mèrat de Vaumartoise, F. V. s.n.* (3); *Mereles, F. & Degen, R. 5570* (5), *5616* (5), *5642* (5), *5859* (5), *6114* (5); *Mexia, Y. 4341* (5), *7834* (5); *Meyer, T. 3652* (5), *3663* (5), *5048* (5), *13127* (5), *9900* (5); *Michel, R. de 2* (5); *Miller, G. S. 1358* (3), *1490* (1); *Morales, G. 497* (12); *Morel, I. 7268* (5), *7350* (5); *Mori, S. A. 12747* (10); *Mori, S. A. et al. 10737* (10), *10813* (10); *Morrone, O. et al. 1388* (15); *Morton, C. V. s.n.* (5); *Murguia R., O. 379* (5), *536* (5).

Nee, M. 35288 (5), *35317* (5), *35330* (5), *40420* (5), *44597* (5), *49083* (5), *51723* (5), *51723* (5), *51149* (5), *51171* (5), *51132* (5), *51320* (5), *51132* (5), *51320* (5), *51337* (5); *Nee, M. & Bohs, L. 50828* (5); *Nee, M. et al. 50736* (5), *51722* (5), *51773* (7), *51777* (7), *51795* (7), *52101* (5); *Norrbom, A. L. 91/A3* (5); *Novara, L. J. 527* (5), *535* (5), *4572* (5), *4856* (5), *5625* (5), *5892* (5), *7248* (5), *7755* (5).

O'Donell, C. A. 3135 (5), *4321* (5), *4357* (5); *Orozco, C. I. 1062* (12); *Ousset, ? 112* (5).

Pabst, G. & Pereira, E. 6123 (9), *6200* (9), *6281* (9), *6693* (15); *Partridge, W. 61701* (6); *Pedersen, T. M. 2585* (5); *Penseiro, J. & Mariano, D. 4323* (5); *Pérez, L. 173* (15); *Perkins, J. R. 1375* (4); *Pierotti, S. A. s.n.* (5), *2* (5), *4012* (5); *Pinheiro, R. S. 1490* (10); *Pirani, J. R. et al. 3028-A* (10); *Plowman, T. C. 2729* (5), *3241* (3), *2986* (3), *3241* (3), *3256* (4); *Poeppig, E. F. s.n.* (3); *Proctor, G. R. 6104* (3), *7980* (4), *9911* (4), *16625* (3), *20480* (4), *21339* (4), *23668* (3), *24845* (4), *26410* (4), *31565* (3), *31768* (4), *33808* (4); *Proctor, G. R. & Stearn, W. T. 11802* (1); *Purdie, W. s.n.* (1), *135* (3).

Quintero, J. 63 (5).

Ragonese, ? 274 (5), *3000* (5); *Rambo, B. 44621* (15), *52193* (15); *Read, R. W. 1918* (4); *Reitz, P. R. & Klein, R. 7867* (15), *11438* (6), *14584* (15), *15947* (15); *Ribas, O. S. & Silva, J. M. 190* (9); *Richard, L. C. s.n.* (2); *Risso, J. L. 156* (5), *295* (5); *Risso, L. 239* (5); *Rodriguez, F. 21* (5); *Rodriguez, F. M. 249* (5); *Rojas, T. 14486a* (5); *Rossato, M. et al. 2484* (15); *Rugel, F. 94* (3), *144* (3); *Ruthsatz, B. 364/2* (5).

Sagra, R. de la s.n. (3), *294* (3); *Sangster, I. s.n.* (3); *Santos, F. C. 73* (10); *Schafer, J. A. 13795* (3); *Schulz, A. G. 2041* (5), *3839* (5), *8170* (5), *15635* (5), *15825* (5), *17038* (5); *Sehnem, A. 2203* (9), *3934* (9), *12505* (15); *Seidel, R. & Richtre, E. 851* (7); *Sellow, F. s.n.* (10), *244* (10), *819* (10); *Sessé, M. 219* (3), *535* (3); *Siñani 261* (7); *Smith, D. N. & Canne, J. 5793* (17); *Smith, L. B. & Klein, R. M. 13489* (9); *Sobral, M. et al. ICN 7991* (15), *111138* (9); *Solomon, J. C. 10579* (5); *Soria, N. 364* (5), *394* (5); *Spichinger, R. RS2185* (5); *Stearn, W. T. 140* (3), *319* (3), *499* (1), *537* (3), *634* (3), *865* (3), *821* (3), *922* (4); *Stehmann, J. R. 728* (15), *1524* (15), *1549* (9), *1756* (14); *Stehmann, J. R. & Sobral, M. ICN 111362* (15), *ICN 111359* (15); *Stuckert, T. 8170* (5), *8896* (5), *15164* (5), *16820* (5), *17237* (5), *18156* (5), *19721* (5).

Thomas, W. W. et al. 9926 (10), *11202* (10); *Tressens, S. G. et al. 5910* (15).

Valenzuela, L. et al. (18); *Vanni, R. et al. 2362* (5), *4334* (5); *Varela, F. 1545* (5); *Vargas C., I. G. & Tapia, E. 1052* (5); *Vargas C., I. G. et al. 3138* (8); *Venturi, S. 2434* (5), *2655* (5), *5797* (5), *7774* (5), *7857* (5), *9818* (5); *Villafañe, T. 74* (5).

Wasum, R. 270 (9), *1174* (15), *1422* (15), *9015* (15); *Waters, J. s.n.* (1); *Webster, G. L. 3700* (3), *13669* (4); *Webster, G. L. & Proctor, G. R. 5546* (1); *Webster, G. L. et al. 51* (3), *8076* (3); *Weisz, P. BAA 5761* (5); *Whitefoord, C. 1399* (4); *Wilson, N. s.n* (3); *Wilson, P. 11305* (3); *Wood, J. R. I. 9529* (5), *9955* (7); *Wright, C. 3025* (3); *Wright, W. s.n.* (3).

Yuncker, G. 18423 (3).

APPENDIX 3. Specimens used in the analysis of pubescence in *Solanum argentinum*. Collections are listed by senior collector only (for complete data, see Appendix 2), and duplicates in different herbaria are listed separately. ARG = Argentina; BOL = Bolivia; PGY = Paraguay. Sample sizes for latitude and longitude = 160; elevation = 70. Specimens for which an elevation was not given were not included in the analysis for altitude. Digital latitude and longitudes are rounded to two decimal places.

Collector	Number	Location	Digital latitude	Digital longitude	Elevation (m)	Score
Aguilar, R. M.	304	ARG	−25.17	−64.17		1
Alvarez, M. R.	226	ARG	−25.17	−64.17		1
Baer, G. A.	110	ARG	−26.60	−65.30		1
Bartlett, H. H.	19631	ARG	−25.50	−64.30		1
Bartlett, H. H.	19750	ARG	−28.25	−63.92		1
Bartlett, H. H.	20474	ARG	−24.78	−64.15		1
Bartlett, H. H.	19888	ARG	−18.38	−62.92		2
Bartlett, H. H.	19683	ARG	−19.27	−62.47		3
Bartlett, H. H.	20321	ARG	−29.22	−65.45		3
Bastian, E.	1347	BOL	−29.12	−65.35	1800	3
Beck, S. G.	6459	BOL	−28.62	−65.80		1
Bernardi, L.	20283	PGY	−24.82	−65.45		2
Bernardi, L.	20283	PGY	−20.05	−63.53		2
Bourdy, G.	2017	BOL	−26.08	−65.97		1
Brizuela, A.	1145	ARG	−26.08	−65.97		1
Brizuela, A.	523	ARG	−23.33	−64.25		1
Brizuela, A.	893	ARG	−22.33	−62.62		1
Brizuela, J.	744	ARG	−22.30	−62.53		1
Buratovich, F.	446	ARG	−22.30	−62.53		2
Burkart, A.	12017	ARG	−22.58	−63.33	1400	3
Cabrera, A. L.	31020	ARG	−22.30	−62.53		3
Cabrera, A. L.	31427	ARG	−26.08	−65.97		3
Cárdenas, M.	4754	BOL	−17.58	−62.67	900	1
Charpin, A.	20717	ARG	−26.10	−64.32	1700	1
Charpin, A.	25819	ARG	−26.10	−64.32		3
Charpin, A.	25819	ARG	26.08	−65.97		3
Charpin, A. S.	20717	ARG	−25.25	−65.42	1700	1
Comisión para la Medición de un Arco de Meridiano	896	ARG	−27.28	−65.00		2
Cordini, J. I.	67	ARG	−27.92	−63.90		2
Cozzo, ?	77	ARG	−27.92	−63.90		1
Degen, R.	3149	PGY	−25.17	−64.17		1
Degen, R.	3149	PGY	−26.82	−65.22		1
Degen, R.	3149	PGY	−26.82	−65.22		1
Degen, R.	3176	PGY	−25.70	−63.07		1
Degen, R.	3179	PGY	−22.33	−62.62		1
Fries, R. E.	s.n.	ARG	−22.30	−62.53		1
Fuentes, A.	1958	BOL	−25.17	−65.17	300	1
Gramaja, A.	16	ARG	−25.17	−65.17		1
Gramaja, A.	16	ARG	−25.17	−65.17		1
Hayward, K. J.	2078	ARG	−25.17	−65.17		1
Huidobro, A. M. R.	536	ARG	−18.83	−65.25	713	3
Hunziker, A. T.	1064	ARG	−20.03	−63.52	1200	1
Jardim, A.	1550	BOL	−18.65	−63.25	1385	3
Killeen, T.	4209	BOL	−29.87	−63.73	700	3
Krapovickas, A.	27143	ARG	−18.67	−63.24		1
Krapovickas, A.	27157	ARG	−18.67	−63.24		1
Krapovickas, A.	27157	ARG	−26.88	−64.73		1
Krapovickas, A.	46303	ARG	−28.17	−65.67		1
Krapovickas, A.	56552	ARG	−25.62	−65.47		2
Krapovickas, A.	17526	ARG	−28.20	−65.13		3

Appendix 3. Continued.

Collector	Number	Location	Digital latitude	Digital longitude	Elevation (m)	Score
Krapovickas, A.	28017	ARG	−28.17	−65.67		3
Krapovickas, A.	28397	ARG	−28.17	−65.67		3
Krapovickas, A.	30423	ARG	−24.58	−65.58		3
Krapovickas, A.	30909	ARG	−31.40	−64.18	350	3
Krapovickas, A.	30909	ARG	−24.82	−65.45	350	3
Krapovickas, A.	31246	BOL	−32.42	−63.25		3
Krapovickas, A.	39269	ARG	−19.58	−62.58		3
Kuroiwa, N.	2332	BOL	−26.78	−65.25		3
Lillo, M.	3343	ARG	−24.28	−65.10		1
Lillo, M.	3343	ARG	−24.28	−65.10		1
Lillo, M.	9837	ARG	−24.28	−65.10		3
Malvárez, M. R.	653	ARG	−24.28	−65.10		1
Malvárez, R.	1401	ARG	−26.15	−65.30		3
Malvárez, R.	155	ARG	−26.50	−64.92		3
Mereles, F.	5570	PGY	−26.50	−64.92		1
Mereles, F.	5570	PGY	−25.60	−65.63		1
Mereles, F.	5642	PGY	−25.60	−65.63		2
Mereles, F.	5859	PGY	−25.60	−65.63		2
Mexia, Y.	4341	ARG	−30.20	−64.48	760	1
Mexia, Y.	7834	ARG	−34.58	−58.48	762	1
Mexia, Y.	7834	ARG	−21.68	−64.83	762	1
Mexia, Y.	7834	ARG	−29.83	−63.50	762	1
Meyer, T.	3652	ARG	−22.63	−59.67	1260	3
Meyer, T.	5048	ARG	−22.63	−59.67	360	3
Meyer, T.	9900	ARG	−26.90	−60.13		3
Meyer, T.	9900	ARG	−23.22	−64.10		3
Meyer, T.	9900	ARG	−25.20	−58.00		3
Morel, I.	7268	ARG	−24.68	−64.25		3
Murgia, O.	379	BOL	−22.97	−61.83	3400	1
Nee, M.	35288	BOL	−23.28	−61.47	820	1
Nee, M.	49083	BOL	−17.77	−63.18	550	1
Nee, M.	50736	ARG	−17.77	−63.18	425	1
Nee, M.	51723	BOL	−24.07	−64.27	550	1
Nee, M.	51723	BOL	−24.07	−64.27	550	1
Nee, M.	40420	BOL	−25.53	−65.57	420	2
Nee, M.	40420	BOL	−25.53	−65.57	420	2
Nee, M.	35317	BOL	−25.60	−65.30	800	3
Nee, M.	35317	BOL	−24.33	−59.50	800	3
Nee, M.	35330	BOL	−24.33	−59.50	810	3
Nee, M.	44597	BOL	−24.33	−59.50	500	3
Nee, M.	44597	BOL	−27.33	−58.93	500	3
Nee, M.	44597	BOL	−23.43	−60.15	500	3
Nee, M.	44597	BOL	−26.48	−65.37	500	3
Nee, M.	50828	ARG	−25.25	−65.42	1300	3
Nee, M.	51132	BOL	−24.25	−64.83	810	3
Nee, M.	51132	BOL	−21.67	−64.83	810	3
Nee, M.	51149	BOL	−55.33	−65.17	850	3
Nee, M.	51171	BOL	−24.30	−64.97	920	3
Nee, M.	51320	BOL	−25.50	−68.50	900	3
Nee, M.	51320	BOL	−26.20	−64.78	900	3
Nee, M.	51337	BOL	−26.20	−64.78	850	3
Nee, M.	51722	BOL	−25.30	−64.90	520	3
Nee, M.	51722	BOL	−20.35	−63.47	520	3
Nee, M.	51722	BOL	−20.30	−63.27	520	3
Nee, M.	51722	BOL	−25.38	−65.10		3
Novara, L. J.	527	ARG	−26.47	−65.18		2

Appendix 3. Continued.

Collector	Number	Location	Digital latitude	Digital longitude	Elevation (m)	Score
Novara, L. J.	527	ARG	−24.90	−65.48		2
Novara, L. J.	5625	ARG	−24.75	−65.25		2
Novara, L. J.	5625	ARG	−22.90	−63.98		2
Novara, L. J.	7248	ARG	−22.90	−63.98	1400	2
Novara, L. J.	4856	ARG	−20.75	−63.15	1133	3
Novara, L. J.	4856	ARG	−22.23	−63.70		3
Novara, L. J.	535	ARG	−20.07	−63.54	1180	3
Novara, L. J.	5892	ARG	−24.38	−65.10	1200	3
Novara, L. J.	5892	ARG	−27.50	−59.60	1200	3
Novara, L. J.	7755	ARG	−25.98	−64.95	1150	3
O'Donell, C. A.	4321	ARG	−24.90	−65.48		1
O'Donell, C. A.	3135	ARG	−23.33	−64.25		3
O'Donell, C. A.	4357	ARG	−24.78	−64.23		3
Pierotti, S. A.	s.n.	ARG	−24.78	−64.23		1
Pierotti, S. A.	s.n.	ARG	−24.78	−64.23		1
Pierotti, S. A.	4012	ARG	−25.00	−58.67		2
Pierotti, S. A.	4012	ARG	−20.40	−63.28		2
Pierotti, S. A.	4012	ARG	−20.40	−63.28		2
Pierotti, S. A.	2	ARG	−20.43	−63.28		3
Plowman, T. C.	2729	ARG	−18.13	−63.20	77	3
Plowman, T. C.	2729	ARG	−18.13	−63.20	77	3
Quintero, J.	63	ARG	−18.13	−63.20		1
Ragonese, ?	274	ARG	−18.13	−63.20		3
Ragonese, ?	3000	ARG	−23.56	−64.97		3
Risso, J. L.	156	ARG	−20.09	−63.52		1
Risso, J. L.	295	ARG	−20.09	−63.52	900	1
Ruthsatz, B.	364	ARG	−20.05	−63.53	2120	1
Schulz, A. G.	17038	ARG	−20.28	−63.45		2
Schulz, A. G.	15635	ARG	−19.90	−63.53		3
Schulz, A. G.	15825	ARG	−19.90	−63.53		3
Schulz, A. G.	3839	ARG	−19.94	−63.52		3
Schulz, A. G.	8170	ARG	−18.14	−63.20		3
Solomon, J. C.	10579	BOL	−18.14	−63.20		3
Spichinger, R.	2185	PGY	−18.13	−63.19	100	2
Stuckert, T.	15164	ARG	−18.13	−63.19		1
Stuckert, T.	15164	ARG	−25.60	−65.63		1
Stuckert, T.	16820	ARG	−25.60	−65.63		1
Vanni, R.	4334	ARG	−24.78	−64.88		3
Vargas, I. G.	1052	BOL	−25.75	−55.38	400	1
Venturi, S.	2434	ARG	−25.75	−55.38	550	1
Venturi, S.	5797	ARG	−23.93	−62.55	500	1
Venturi, S.	5797	ARG	−23.33	−64.25	500	1
Venturi, S.	5797	ARG	−24.78	−65.02	500	1
Venturi, S.	5797	ARG	−23.33	−64.25	500	1
Venturi, S.	7774	ARG	−27.47	−58.83	1000	1
Venturi, S.	7857	ARG	−27.47	−58.83	800	1
Venturi, S.	7857	ARG	−24.22	−67.07	800	1
Venturi, S.	9818	ARG	−28.38	−62.12	1300	1
Venturi, S.	9818	ARG	−26.83	−61.00	1300	1
Venturi, S.	9818	ARG	−27.33	−58.93	1300	1
Venturi, S.	2655	ARG	−27.33	−58.93	800	2
Villafañe, T.	74	ARG	−27.57	−60.53		1
Weisz, P.	5761	ARG	−21.82	−64.67		1
Wood, J. R. I.	9529	BOL	−24.25	−61.25	1900	1